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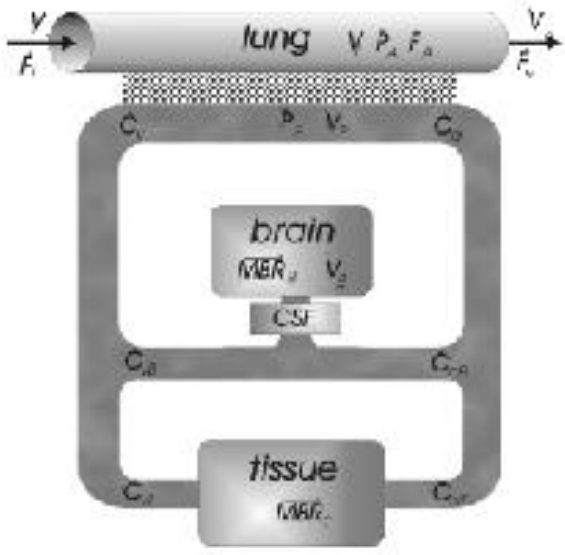

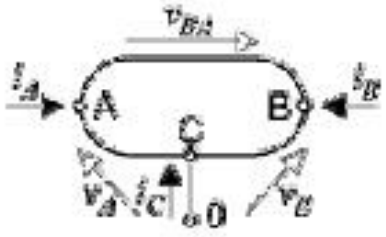

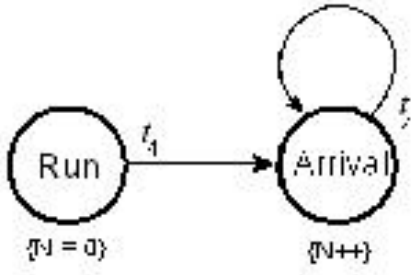

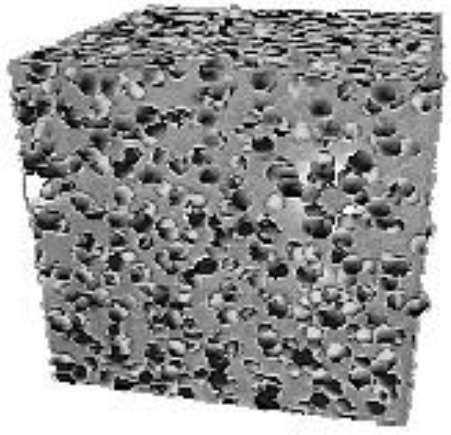

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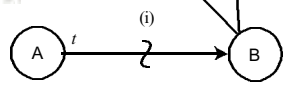

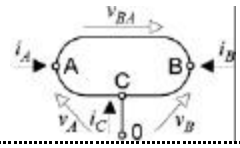

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Aims & Scope

The journal **S**imulation **N**ews **E**urope (SNE) publishes information related to modelling and simulation. SNE's aims are i) to inform about new developments in simulation methods and applications by means of technical notes, comparisons, etc., ii) to report news from European simulation societies and events from international simulation societies and groups all over the world, and iii) to act as official membership journal of EUROSIM and SCS Europe.

SNE contains news on EUROSIM, on the EUROSIM societies, on SCS Europe and on other international Simulation Societies and groups. Furthermore SNE presents "simulation centres" and introduces simulationists. A calendar of simulation conferences and a hotlinks list (both database -driven) conclude the *news section*.

Archive Section. SNE publishes technical notes and short notes: general overviews or new developments, new software and hardware, new applications and methods. Industry news inform about new products, etc. Due to co-operation with publishers SNE reviews most recent books on modelling, simulation, mathematics and computer engineering. The special series "Comparison of Simulation Technique and Simulation Software" (ARGESIM Comparisons) gives a comprehensive overview on developments of simulation technique and software.

SNE is a printed journal as well as an electronic journal, which is reflected by the *archive section* and the *news section*. The *news section* (inner pages of SNE) can be found on the web one-to-one, contribution in the *archive section* (outer pages) are administrated by a database with WWW - interface:

http://www.argesim.org/sne/

All contributions are selected and may be edited. If you want to publish news or if you want information about publication in the archive section, please send news to the corresponding member of the reports editorial board (p. XXX), or contact a member of the general editorial board (p. 48), or the editor-in-chief.

Editorial

Dear readers,

This is the second SNE *issue in a new layout - a result of our re-organisation in summer 2000, and we have got a lot of positive reactions.*

The highlights of this issue are two Technical Notes, the one about event graphs - a tool with minimalist design but exact description of event scheduling, the other about WAZOO, a tool for modelling and simulation of molecular dynamics (for the next issue we are planning a technical note about basics of molecular dynamics and comparison with Mote Carlo – methods).

Furthermore, short notes briefly sketch parallel processing in simulation, hybrid simulation, web-based simulation courses, identification in discrete models, and optimal scheduling. The book reviews in new design are continued.

The series of ARGESIM comparisons is continued by a new comparison, C13 Crane and Embedded Control. This comparison - originally developed for testing VHDL-AMS simulators - addresses each kind of continuous or hybrid simulator, emphasizing on digital control and sensor action. We invite our readers to take this new challenge and to send in solutions.

***SNE's** broader basis is reflected by an increase of the editorial board: a reports' editorial board takes care on news from societies, a new editorial board is responsible for technical and short notes, centers, etc.*

The readers enjoyed the double issue of December 2000. Also this issue has become almost a double issue. Consequently we intend to publish again a double issue in autumn (September or October).

I hope, you enjoy this issue, and I thank all authors and members of editorial boards for their co-operation

Felix Breitenecker, editor-in-chief
Felix.Breitenecker@tuwien.ac.at

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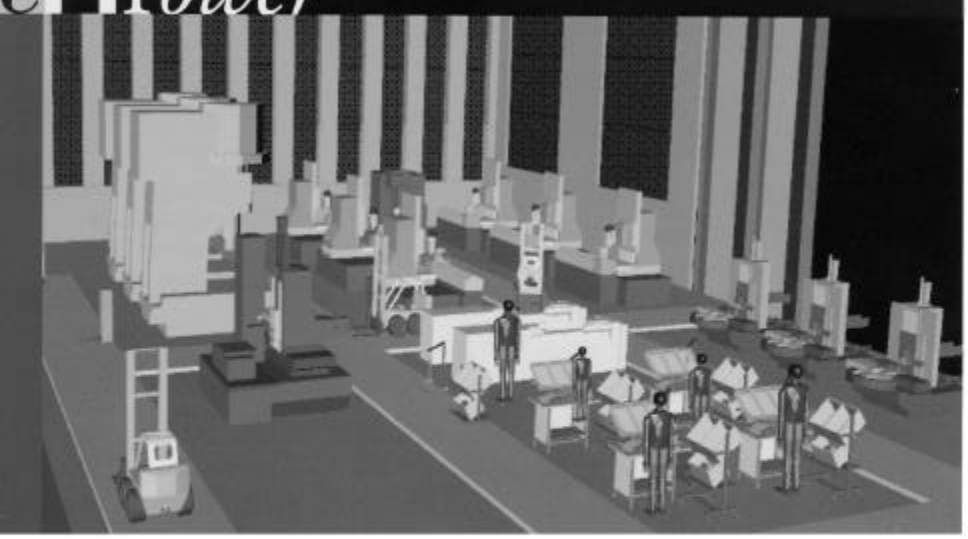

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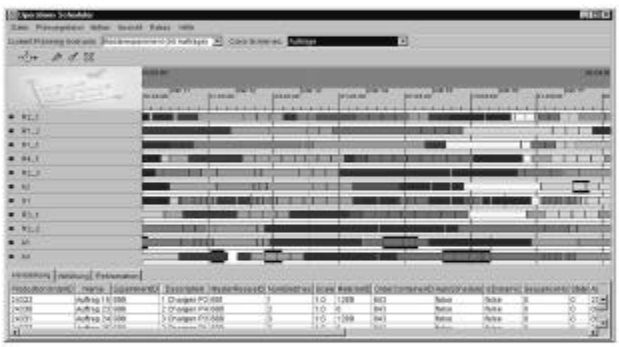

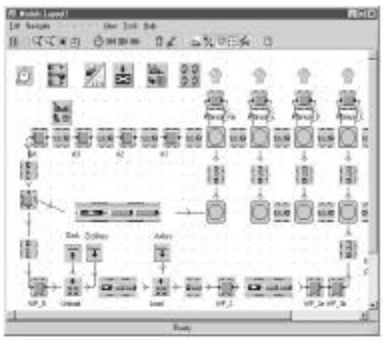

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Impressum

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TECHNICAL NOTES

Basic Event Graph Modeling

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Introduction

This paper is a brief introduction to Event Graph methodology. Event Graphs are a way of graphically representing discrete-event simulation models. They have a minimalist design, with a single type of node and two types of edges with up to three options. Despite their simplicity, Event Graphs are extremely powerful.

The Event Graph is the only graphical paradigm that directly models the event list logic. There are no conceptual limitations to the ability of Event Graphs to create a simulation model for any circumstance. Their simplicity, together with their extensibility, make them an ideal tool for rapid construction and prototyping of simulation models. Discrete Event Simulation

We assume the reader is familiar with the basic concepts of discrete event simulation (see any introductory text such as Law and Kelton 1991), so we will only briefly review the basics.

Two fundamental components of a discrete event simulation model are

- a set of state variables,
- and a set of events.

The model emulates the system being studied by producing state trajectories, that is, the time history of successive values of the system's state variables. Measures of performance are computed as statistics based on these state trajectories.

Discrete event models are characterized by state trajectories that are piecewise constant. Events occur at the points in time at which at least one state variable changes value. It is important to note that an event is an instantaneous occurrence in the discrete event model. No simulated time passes when an event occurs; simulated time passes only between the occurrence of events.

The timing of the occurrence of events is controlled by the Future Event List (or simply the Event List), which is nothing more than a “to-do” list of scheduled events. Whenever an event is scheduled to occur, an event notice is created and stored on the future events list.

Every event notice contains two pieces of information:

- *what event is being scheduled; and*
- *the (simulated) time at which the event is to occur.*

The Event List keeps the event notices in order by ranking them based on the lowest scheduled time. Events occurring simultaneously in simulated time must be prioritized according to some secondary rule. The future events list is managed by basic discrete event algorithm that controls the flow of time in the simulated world of the model.

At each iteration the algorithm examines the event list to see if there are any scheduled events. An empty list means there is nothing to do, so the simulation terminates (i.e. the simulation run ends). If the event list is not empty, the simulated clock is updated to the time of the first event and the associated event is executed - that is, the state transitions associated with that event are performed.

Note that the terminating condition (empty event list) means the simulation must be initiated with at least one scheduled event for any event to actually occur. We follow Schruben (1995) by identifying one distinguished event (Run) that is always on the event list initially. The Run event is responsible for scheduling the initial events of the model.

By convention, when an event occurs, all state changes associated with that event are first performed. Next, all further events are scheduled, and finally the event notice is removed from the Event List.

The events scheduled are specified by the occurring event itself and may be conditional on certain values of the current state. The order of execution for these three steps could be altered and different, but equivalent, models would result. Although it is possible to perform the actions in arbitrary order (e.g. First change some states, then schedule some events, then change some more states, etc.), the resulting models would be confusing and error-prone. There is considerable benefit from adapting a convention such as the one above.

Event Graphs

Event Graphs are a way of representing the Future Event List logic for a discrete-event model. An Event Graph consists of nodes and directed edges. Each node corresponds to an event, or state transition, and each edge corresponds to the scheduling of other events. Each edge can optionally have an associated boolean condition and/or a time delay.

Figure 1 shows the fundamental construct for Event Graphs and is interpreted as follows: the occurrence of Event A causes Event B to be scheduled after a time delay of t, providing condition (i) is true (after the state transitions for Event A have been performed).

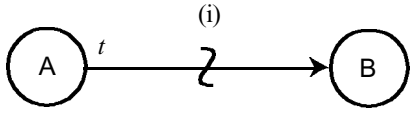


Figure 1. Fundamental Event Graph Construct

By convention, the time delay t is indicated toward the tail of the scheduling edge and the edge condition is shown just above the wavy line through the middle of the edge. If there is no time delay, then t is omitted. Similarly, if Event B is always scheduled following the occurrence of Event B, then the edge condition is omitted, and the edge is called an unconditional edge.

Thus, the basic Event Graph paradigm contains only two elements: the event node and the scheduling edge with two options on the edges (time delay and edge condition).

The simplicity of the Event Graph paradigm is evident from the fact that we can represent any discrete event model using only these constructs (Schruben 1992, 1995; Schruben and Yücesan 1993). An advantage of the minimalist approach of Event Graphs is that the modeler can spend more time on model formulation and less on learning the constructs of the paradigm.

There is a price to the simplicity of Event Graphs, however. Since Event Graphs represent the event scheduling relationship, rather than the physical movement of, say, customers through a queueing system, Event Graphs require a higher degree of abstraction on the part of the simulation modeler than the more commonly used process/resource world view.

The author's experience using Event Graphs in an introductory simulation course is that the higher abstraction of Event Graphs is easy to master and provides rich payoffs for understanding and creating discrete event simulations.

Indeed, the use of Event Graphs tends to accelerate the understanding of the Discrete Event paradigm.

Example

The simplest non-trivial Event Graph is the Arrival Process, a model with a single event (Arrival) and a single state variable, the cumulative number of arrivals (N). The time between arrivals is modeled as a sequence of interarrival times $\{t_A\}$ that can be constant, a sequence of iid random variables (making the model that of a renewal process), or any arbitrary process of non-zero numbers.

The state transition for the Arrival event is that the cumulative number of arrivals (N) be incremented by 1. The Event Graph for the Arrival Process is show in Figure 2.

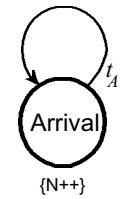


Figure 2. The Arrival Process Event Graph

Since the Event List is initially empty, the terminating condition for the simulation run, there must be at least one event scheduled initially. Event Graphs provide this by means of a bootstrapping event called "Run." The Run event is placed on the Event List at time 0.0 but is otherwise an ordinary event with associated state transitions and scheduling edges.

Thus, to make the Arrival Process model in Fig. 2 a complete running model, a Run event is added that simply initializes the cumulative number of arrivals to 0 and scheduled the first arrival, as shown in Figure 3.

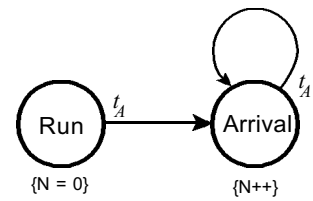


Figure 3. Arrival Process with Run Event

Simultaneous Events

There is one difficulty in the straightforward application of the Event Graph methodology presented so far to complex models, namely that of resolving the execution order of simultaneous events.

Simultaneous events occur when more than one event is schedule to occur the exactly the same time.

In some cases the order of execution of the events is irrelevant, but in other cases certain permutations of the order of occurrence impact the outcome dramatically, often leading to invalid state trajectories and inadmissible values of state variables. Since computers have finite precision, this possibility cannot be discounted even when "continuous" random variables are being used. For the simple model in Figure 3 there is no problem with simultaneous events, but even in slightly more involved models (such as the queueing model discussed in the following section) the problem of resolving simultaneous events arises. If discrete probability distributions are used to model delay times then the potential for simultaneous events increases dramatically.

Event Graph methodology provides the capability of prioritizing scheduling edges, so that simultaneous occurrences of the scheduled event always occur before other scheduled events. Although these edge priorities are typically not indicated on the graph itself, all software implementations of Event Graph methodology support edge prioritization.

Further Examples

We will now present some additional examples of Event Graph models. The first is a standard multiple-server queue.

Multiple Server Queue

Description.

Customers arrive to a service facility according to an arrival process and are served by one of k servers. Customers arriving to find all servers busy wait in a single queue and are served in order of their arrival.

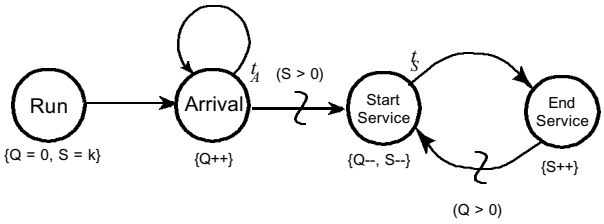
Parameters

$\{t_A\}$ = interarrival times; $\{t_S\}$ = service times; k = total number of servers.

State Variables

Q = # of customers in queue; S = # of available servers

Event Graph



Comments

In this model, entity-oriented data (such as time in queue or time in system) are not explicitly available. The idea is that time-varying statistics can be collected on each state variable and these are ordinarily sufficient to compute any desired performance measure. In this case, Little's formula can be applied to translate time averages into tallied statistics for delay in queue or time in system.

This model bears a superficial resemblance to a process-oriented model, since the events correspond to the sequence of actions that occur as a customer proceeds through the system.

However, close inspection shows that the scheduling edge going "backwards" from the EndService event to the StartService event do not have a direct correspondence in a process model.

The Event Graph captures the scheduling dependencies of the events in the model, not the flow of customers or entities through the system. That is, the Event Graph does not represent a synchronous flow of event execution, but scheduling relationship between the various events which are executed asynchronously when the simulation is run.

For more flexible models, it is highly desirable to separate the arrival process from the server part of the model into two distinct components. The two components can be loosely-coupled to work together (see Buss, 2000).

For this introductory note, however, we will confine ourselves to simple models with no component approach.

Tandem Queue

Description

Arriving customers are processed by one workstation consisting of a multiple-server queue.

Upon completion of service at the first workstation, a customer proceeds with probability p to a second workstation or departs the system with probability (1- p).

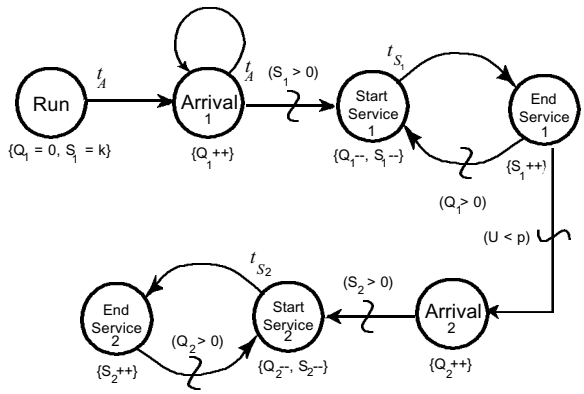
Parameters

$\{t_A\}$ = interarrival times; $\{t_{Si}\}$ = service times at workstation i (i=1,2); k_i = total number of servers at workstation i; p = probability of customer proceeding to second workstation; {U} a sequence of iid Un(0,1) random variables.

State Variables

Q_i = # of customers in queue for workstation i;
S_i = # of available servers at workstation i.

Event Graph:



Comments

This model can easily be extended to models with any number of workcenters by appending more copies of the "Server" portion of the Event Graph.

However, as the number of workcenters becomes very large, the resulting model becomes unwieldy. Process-oriented methodologies have the same difficulty scaling up.

More scalable Event Graph models can be created in two ways: exploiting parameters on edges and events, discussed below, and the use of a component framework for creating "building blocks" consisting of relatively small Event Graph pieces Buss (2000).

Extensions

In principle the simple construct in Figure 1 is all that is needed to create any discrete event simulation models. In practice, however, there are two simple extensions that enhance event graph models' ease of use and enable much simpler models to be created. These extensions are the cancelling edge and the ability to pass parameters on edges.

Cancelling Edges

The cancelling edge is the inverse operation of the scheduling edge, and is represented in Figure 4.

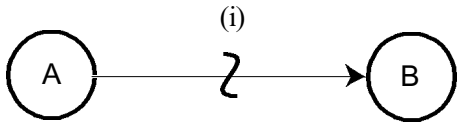


Figure 4.Cancelling Edge

The interpretation of Figure 4 is as follows. Whenever event A occurs, then if condition (i) is true, the first occurrence of event B is removed from the event list.

If event B is not scheduled to occur, then nothing happens. If there are multiple occurrences, only the first is removed. The priority of the events is used to break ties when multiple events of the same type are scheduled to occur at the same time.

Example: Server With Failures

Description.

A machine is subject to periodic failures, which occur after a certain amount of time regardless of how long it has actually been in service. Upon failure, the part being processed (if any) is returned to the queue until the machine is repaired.

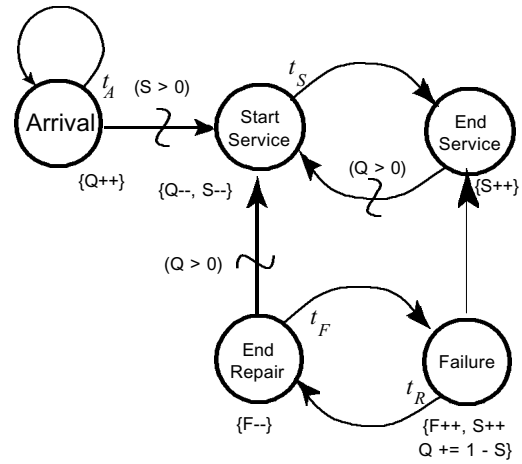
Parameters

$\{t_A\}$ = the sequence of interarrival times of parts; $\{t_S\}$ = the sequence of service times; $\{t_F\}$ = machine times-to-failure; $\{t_R\}$ = repair times.

State Variables

Q= # of parts in queue; S = 1/0 if machine is available/busy; F = 0/1 if machine is working/failed.

Event Graph.



Notes

The initialization of the Event Graph above has been omitted for clarity. Initially, there should be an Arrival event and a Failure event on the event list. Note how the condition for an Arrival event triggering a StartService event now is that the machine be both available and working.

The priority order for simultaneous events is Failure < StartService < Arrival. That is, a Failure event will be performed before all other StartService and Arrival events that are scheduled at exactly the same time. Similarly, every StartService event will be performed before every other simultaneously scheduled Arrival event.

Note that these priorities apply only when the events are scheduled to occur at exactly the same time. The other events do not need to be ordered.

Parameters on Edges

The second important extension is the ability to pass parameters on edges to event nodes. This is represented in Figure 5 for both scheduling and for cancelling edges.

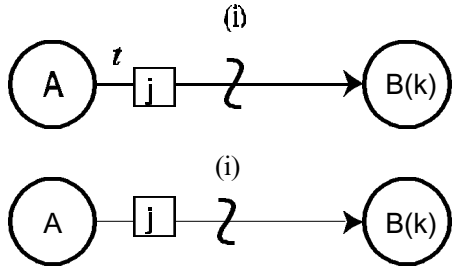


Figure 5. Scheduling and Cancelling Edges with Parameters

The interpretation of the constructs in Figure 5 as follows.

- For the scheduling edge with parameter: When Event A occurs then, if condition (i) is true, event B is scheduled to occur after a delay of t time units; when B occurs, its parameter k will be set to the value given by the expression j.
- For the cancelling edge with parameter: When event A occurs then, if condition (i) is true, the first scheduled event of type B whose parameter k exactly matches j is removed; if no such event is found, then nothing happens. When event B occurs, the value of expression j is that which it had when the scheduling event A occurred.

The relationship between the parameter on the event node and the matching parameter on the scheduling edge is the same as that between the code in a program that invokes a procedure with an argument and the argument of the procedure that matches the call.

Thus, in Figure 5, j is an expression that resolves to a value only when event A occurs, whereas k is a formal parameter. The parameter can be considered a "time capsule," that is, a means of passing information about the current state of the model to a future event.

Example: Transfer Line

The capability of passing parameters on edges enables a generic model of multiple server queues in series to be created. To model a series of three or more workstations in a line by extending the tandem queue above would require modification of the Event Graph itself.

Instead, using parameters on edges, one event graph model can be developed that can model any number of workstations in a series based only on input data.

Description

Arriving customers are processed by n workstations in a series, each consisting of a multiple-server queue. Upon completion of service at each workstation, a customer proceeds to the next workstations and departs the system when service at the last workstation is complete.

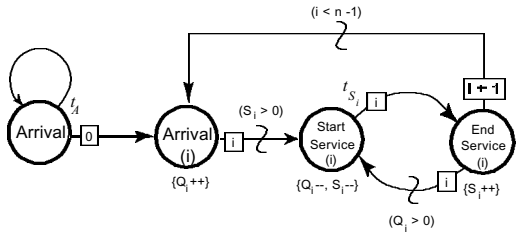
Parameters.

n = number of workcenters (numbered 0,...,n-1); $\{t_A\}$ = interarrival times of customers to the system; $\{t_{Si}\}$ = service times at workstation i; k_i = total number of servers at workstation i.

State Variables

Q_i = # of customers in queue for workstation i; S_i = # of available servers at workstation i.

Event Graph:



Comments

In this model, parts come into the system with the ArrivalToSystem event, which is distinct from the Arrival event which signifies the arrival of a part to a workcenter. The parameter on each scheduling edge is the workcenter for which the scheduled event is to occur.

Implementations

To the author's knowledge there are only two software packages that directly support building Event Graph models, Sigma™ and Simkit.

Sigma

Sigma™ is a windows program that allows the modeler to draw the Event Graph in a palette, then add state variables and parameters to events and edges in dialog boxes. The model can be executed graphically, and the standard set of statistics and plots generated. A very useful feature is the ability to generate the C code for the model so it can be run as an independent program.

Simkit

Simkit is a set of Java™ packages that support building discrete-event models from an Event Graph perspective. It does not currently have any built-in graphic capabilities, such as the Event Graph palette in Sigma. However, it is Open Source and freely available under the GNU Public License.

Simkit extends the basic Event Graph paradigm by adding a component architecture based on loose coupling of simulation components. More information on this approach can be found in Buss (2000). Simkit can be downloaded from the internet at the following URL:

http://diana.or.nps.navy.mil/simkit/

Conclusions

Event Graphs are a simple, yet powerful way to create Discrete Event Simulation models. Their simplicity makes them an excellent platform for teaching discrete event simulation, and their power makes them a good platform for building many different types of simulation model. The examples shown should give an indication of their usefulness in creating discrete event simulation models. Some simple extensions extend the flexibility and expressiveness of event Graph models. There are two software packages to assist the creation of simulation programs based on Event Graph models.

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WAZOO - A Programming Language for Molecular Dynamics

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Molecular Dynamics

Molecular Dynamics (MD) is a technique to simulate the interactions between a large number of particles. Its applications range from theoretical physics, material science to biochemistry.

The first step in MD is to describe the interacting forces between the particles and the spatial configuration of the particles. These forces are summed up for every particle.

Then the new configuration is calculated by solving the equation of motion $m\ddot{x} = \vec{F}$.

The calculation of the interacting forces is the most time-consuming step in the simulation: If there are N particles in the simulation then for every particle the interactions with N-1 particles have to be calculated.

Because of Newton's Third Law (actio = reactio) the force $\vec{f}_{ij}$ the particle i exerts on particle j is $-\vec{f}_{ji}$ (the opposite of the force the particle j exerts on i).

Therefor only one half of the forces have to be calculated. Nevertheless $\frac{N(N-1)}{2}$ interactions have to be calculated which can be prohibitively large for a reasonable number of particles.

This number can be reduced by taking the spatial composition into account: For most physical interactions the interacting forces approach 0 for big distances.

By excluding the interacting forces between particles that are far apart the calculation time can be reduced. Common techniques for this are spatial decomposition and next neighbor lists.

There is a number of tasks, that are routinely done in a MD simulation and are similar for every MD simulation:

- Numerical integration in time
- optimization of the interaction calculations
- vector arithmetics in three spatial
- output and analysis of particle data

In practise these things are written anew every time a new model is implemented or an existing program is modified to suit the new model.

This involves a lot of programming effort that is redundant and error-prone and has nothing to do with the actual model.

The aim of WAZOO is to disburden the user from these tasks and to enable him to simply write down the model.

Description of WAZOO

The WAZOO language is a simulation language designed to write down MD models. The language is based on C++. It is designed to make it possible to formulate molecular dynamics models in a "natural"' way, especially by supporting vector arithmetics in three-dimensional cartesian coordinates.

The particles are the building blocks of the models and the central data structure for the description of the equations of motion.

All other parts of the WAZOO system are designed in respect of the programming language.

The reasons why C++ was chosen as a base language are:

- C++ is widely used, compilers are available on almost all machines
- the object-oriented features of C++ facilitate the inclusion of additional data types like vectors
- C++ is as fast as Fortran (which is used for most MD simulation codes)

WAZOO follows the CSSL-Standard for simulation languages: Programs are divided into

- a part describing the initial configuration of the model,
- a part describing the development of the model,
- parts for discrete events
- and a part that is executed at the end of an experiment.

Inside these parts special WAZOO-constructs and C++-code can be intermixed. This enables the user to insert things into a model (for instance special routines for the analysis of the particle places) that are not included in the definition of WAZOO without having to modify the language.

What distinguishes WAZOO form other continuous simulation languages is the description of the particles: Groups of particles can be declared. These groups constitute different classes of particles (for instance different types of atoms).

The user specifies the interaction of a particle from a group with a particle from another group (or another particle from the same group) with a short C++-code. The program, that is generated by WAZOO, automatically sums up all these interactions for all particles.

Properties of a particle are the location, the velocity and the acceleration. Velocity and location are calculated from the acceleration by numerical integration of the ordinary differential equations derived from the equation of motion. Other properties can be added to particle groups.

Programs that are generated by the WAZOO compiler do some work, that is essential for molecular dynamic simulations but doesn't have to be implemented by the user: Among other things, the equations of motion are automatically integrated. The number of calculations of interactions is minimized in order to make the simulations run faster.

The user can choose from a number of algorithms for the integration and some methods for the optimization (straight cut-off, next neighbour lists and cube approximation). Variation of parameters and systematic output of the calculated data are also supported.

Implementation of WAZOO

The WAZOO compiler takes a program written in the WAZOO language and generates a C++ program, that is ready to be compiled with an ordinary C++-compiler. To achieve this it uses "skeleton'"-files. These are normal C++-files, mixed with customary tags. The WAZOO compiler inserts code, that was extracted from the user-written WAZOO program, into the code of the skeleton.

The skeletons implement the run-time environment for the WAZOO programs. To generate a executable programs for a system, only the skeleton has to be adapted to that system.

Also different user interfaces or interfaces to other applications can be implemented with skeletons. The only currently implemented skeleton makes it possible to run WAZOO programs as batch programs on a UNIX system.

There are additional C++-classes to support vector arithmetics, particle initialization, analysis and output of data.

A WAZOO example

An example of a program written in WAZOO is given below:

```
set geometry="torus"
set intalg="leapfrog"
set cutoff="neighbour"
constant int npart=16384;
parameter int iCalc=20;
/* more parameters */

Distribution pk(0,rcof,200);

particle Argon : public Particle {
public:
 int ww;
};

particles Argon argon[npart];

initial {
 argon.v_MaxwellDist(average_speed);
 argon.r_FCCLattice(/* .. */);
 pk.reset(0,GlobalCutOff);
}

dynamic {
 derivative {
  double eKin=0,ePot=0;
  for_particle(a=argon) {
   pre {
    interaction_with (b=argon) {
     Vektor d=a.x-b.x; double rs=d*d;
     NonClipVektor kraft;
     kraft=d*(pow(rs,-7)-pow(rs,-4))/2;
     a.f+=kraft;  b.f-=kraft;
     ePot+=(pow(rs,-6)-pow(rs,-3));
     a.ww++; b.ww++;
    }
   }
   post {
    eKin+=(a.v*a.v);
   }
  }
  Time << eKin << "\t" << eKin;
  event(calc,(nStep % iCalc)==0);
  event(terminal,n_step>=iEnd);
 }
 discrete calc {
   for_all(a=argon)
    with_bigger(b=argon)
     pk[(double)(a.x-b.x)];
 }
}

terminal {
 Gpostream opk("pkf.dat");
 opk << pk;
}
```

Parts of the program that are not of general interest have been omitted. These missing parts are indicated by C++-comments: `/* .. */`.

The program describes a gas of `model_size` Argon-Atoms. The interaction between these atoms is described by the Leonard-Jones-forces. These forces are described by the potential

$$U(R) = 4\varepsilon\left(\left(\frac{\sigma}{R}\right)^{12} - \left(\frac{\sigma}{R}\right)^{6}\right)$$

During the simulation the distribution of the distances between particles is measured.

The first part of the program are the settings. In the first line the "geometry" (the way vectors are interpreted) is set. Here it is set to periodic boundaries (particles leaving on one side of a cube enter on the other side) which make the simulation look like an infinite gas. In line 2 the integration algorithm is set.

The next two lines feature two different types of constants: constants with the keyword `constant` can only be changed by recompiling the program. `parameter` can be changed before every run of the program.
This makes it possible to perform experiments with parameter variations easily.

In line 8 a variable to record the distribution of the distances is declared. The class `Distribution` is one of the C++-classes, that are included into WAZOO to make common tasks easier. A `Distribution` object is initialized by giving it the rang over witch the distribution is to be recorded (in our case from `0` to `rcof`) and the number of "bins" used to record that distribution (in our case 100).

The next lines define a new abstract class of particles `Argon`. This particle-class inherits all the basic attributes from the basic particle-class `Particle` and gets the new attribute `ww` to record the number of interactions for each particle. The inheritance mechanism is alike to inheritance in C++.

By default the attributes of `Particle` are the location `x`, the velocity `v` and the force `f` affecting the particle. `x` is of type `Vektor` which means that it is clipped to fit into the afforementioned periopdic boundary conditions. `v` and `f` are of type `NoClipVektor` and therefor can take any value.

Line 15 declares a particle-group named `argon` consisting of `npart` particles of type `Argon`.

The section starting with `initial` is executed at the start of a simulation and implements the initial conditions.

In this example the velocities of the argon atoms are randomly Maxwell-distributed and they form a face-centred-cubic crystal-lattice.

The `dynamic`-section describes the change of the system. It has two parts: the `derivative`-section for continuous and the `discrete`-sections for discrete changes.
Every section can have its own variables, that are only visible inside this section.
In the `derivative`-section is a loop over the particle-group `argon`. The `for_particle`-loop declares a name a for the current particle.
The loop consists of two parts: the `pre`-part is executed before the time-integration is done, the `post`-part after the integration.

Inside the `pre`-part is a `interaction_with`-loop: this kind of loop needs an outer loop. It iterates over all the particles except the current particle of the outer loop and every possible pair of particles is covered only once (thus utilizing the symmetry of the interactions).

The loop also eliminates particle-pairs that are too far apart (by using spatial decomposition or next neighbour lists). It is also ensured that a particle does not interact with itself.

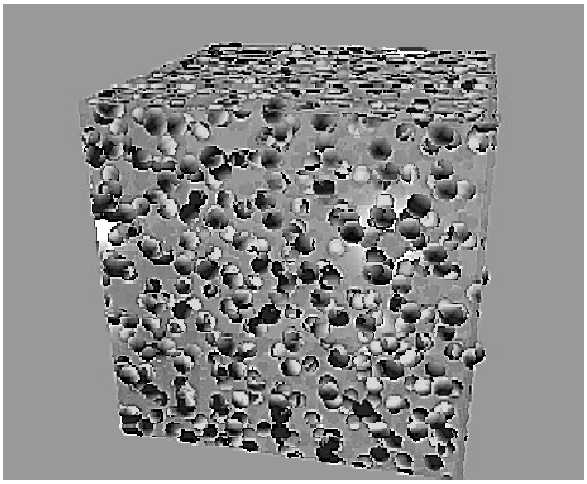
Inside the loop the forces and the potential energy are calculated. There are two types of vectors: `Vektor` for spatial coordinates (these vectors are limited if the simulation works in a finite domain of space; this limitation is defined by the `geometry`) and `NonClipVektor` for velocities or forces.
A lot of operations (like addition, subtraction) are already defined for these vectors.

In the `post`-part the kinetic energy is calculated. The energies `ePot` and `eKin` are printed to the output-stream `Time` after every time step.

The `event`-construct triggers discrete events. In our case the event `calc` is triggered every `nStep` time steps.

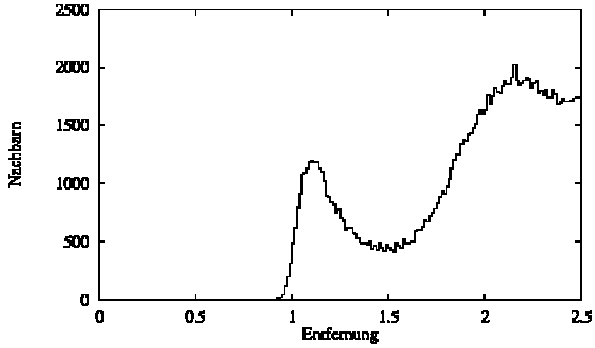
The `discrete`-section `calc` calculates the distribution of the distances between particles.

The event `terminal` is special: it finishes the simulation. At the end of a simulation the `terminal`-section is executed. In our case the distribution of the distances is output to the file `pkf.dat`.



simulation: The transparent cube is the space in which the simulation takes place. The particles are depicted by little balls. Particles that leave the cube at one side enter at the other.

The following picture was produced with a more elaborate variant of our example program. It shows the contents of the distribution that is computed with the variable pk. It is the distribution of the particle-particle distances inside the gas.



Although it is a gas the distribution is not completely random: Due to the hight repulsive forces no particles are nearer than approximately 0.9 to one another.

There is a sharp peak in the distribution at about 1.1 and another one at 2.2 suggesting somme kind of order in the supposedly orderless gas.

Status of WAZOO

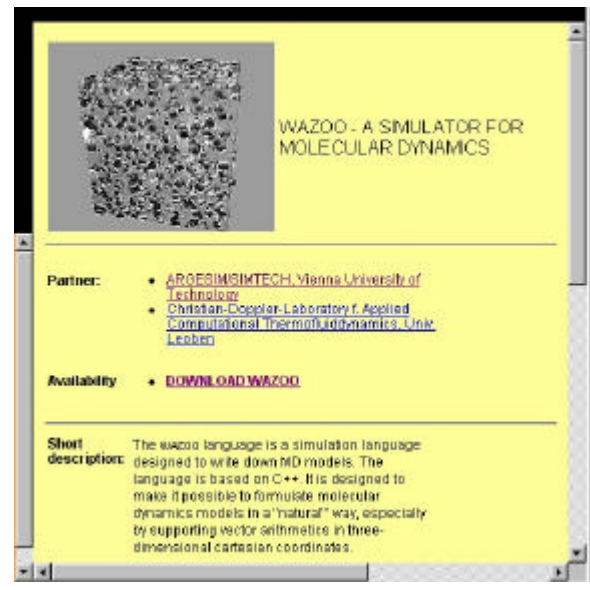
Currently the WAZOO-compiler and a non-interactive run-time-environment are implemented for UNIX-systems. A number of models has been successfully developed and tested.

Supported integration methods are explicit euler, Leapfrog (Verlet), Predictor-Corrector

Different methods to optimize the calculations of the interactions are supported. All of these assume that interactions over distances bigger that a given cut-off-radius are insignificant:

- trivial cut-off: Interactions over bigger distances are not computed.
- next neighbour lists: for every particle a list of posssible interaction-partners is calculated and used to optimize the calculation.
- cube approximation: space is partitioned into subspaces. A list of all the particles in each subspace is kept

In addition to the things mentioned in the example program there are facilities for parameter variation, random number generators, output to different formats, automatic statistics for particle groups



A detailed description and download of the complete WAZOO system can be found at ARGESIM's project page http://www.argesim.org/projects

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SHORT NOTES

Distributed and Parallel Processing with MATLAB – the DP Toolbox

In the last decade multiprocessing systems, especially networked computers, became standard equipment in engineering science and practice. Nevertheless, their exploitation for distributed and parallel processing is mostly a costly affair, because engineering standard tools like MATLAB do not support such concepts on the application layer. To fill this lack the DP Toolbox (Distributed and Parallel Application Toolbox) has been developed which allows interactive development, testing and execution of distributed and parallel applications based on multiple MATLAB instances and other non-MATLAB software.

Up to now, there are no parallel versions of MATLAB or similar packages available for practical use. Already 1995, Cleve Moler stated the reasons ([1]): The granularity of most MATLAB routines is too small for an effective parallelization on multiprocessing systems without shared memory (e.g. PC clusters).

On shared memory systems positive parallelization results can be reached, but the possible speedup is quite limited because of the small number of processors of such systems (usually less than a dozen). Porting the sophisticated memory model of the sequential MATLAB version to multiprocessing systems is very difficult. Under commercial aspects the effort for developing and supporting parallel MATLAB versions is too high in view of the limited number of potential customers.

That are serious technical and commercial aspects against a parallelization of a system like MATLAB. Substantially better prerequisites for distributed and parallel processing exist at the application level:

- *Many scientific and engineering problems are characterized by a considerable run-time expenditure on one side and a medium- or high-grained logical problem structure (e.g. monte-carlo studies, complex simulations, evolutionary optimizations) on the other side. Such problems can be parallelized effectively even on networked computers.*
- *Often, problems cannot be solved in a single environment like MATLAB (e.g. online processing or couplings with external programs). For such problems we do not need a parallel MATLAB, but methods for integrating MATLAB and other autonomous tools to a distributed system.*
- *Because the parallelization and distribution of applications can be done on conventional MATLAB instances (i.e. sequential ones) no effort for developing and supporting special parallel versions is necessary.*

To use multiple MATLAB instances for parallel and distributed processing they must be able to interact among one another. Such functionality is provided by the DP Toolbox.

The DP Toolbox for MATLAB is one realization of the general *Multi-SCE Concept*, which is described in detail in [2]. The abbreviation SCE stands for scientific and technical computing environments; systems like MATLAB, Octave, Scilab etc. This approach brings together the advantages of SCEs (interactive way of working, array-oriented programming, rapid prototyping) and of parallel and distributed processing.

The Multi-SCE Approach and the DP Toolbox are the results of research activities in the field of parallel and distributed processing based on interactive environments at the Institute of Automatic Control, University of Rostock and the Department of Mechanical Engineering, University of Wismar since 1992.

Figure 1 shows how the MATLAB architecture is extended by the DP Toolbox. Due to the added communication module MATLAB instances are able to pass messages among one another and to other programs. The DP Toolbox by itself does not implement primitives for process communication and control. Instead an external message-passing systems is used. The current toolbox versions use the message-passing system PVM ([3]). Because PVM is available for many different operating systems and hardware platforms, MATLAB instances can be coupled via the DP Toolbox also on heterogenous computer clusters and parallel computers.

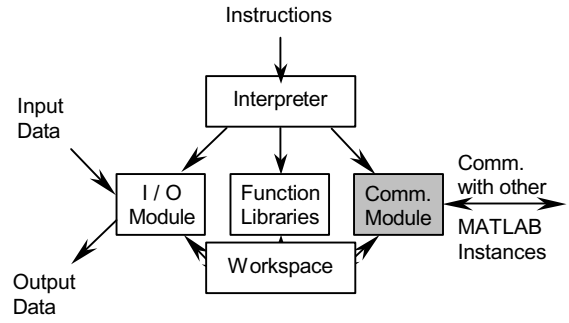

Fig. 1: Extension of the MATLAB architecture

The DP Toolbox is realized as a toolbox set consisting of DPLOW, DPHIGH and DPMM Toolbox (see fig. 2).

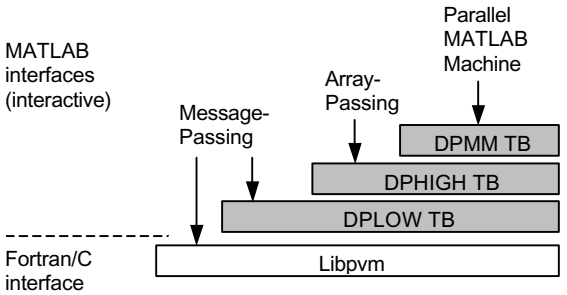

Fig. 2: The DP Toolbox Set

The DPLOW Toolbox implements a MATLAB/PVM interface, that provides the communication primitives of the PVM system in MATLAB. The major application field of this toolbox are couplings between MATLAB applications and other external programs. Additionally, it is very useful for educational purposes, because the DPLOW Toolbox can be used as an "interactive PVM".

For convenient couplings among MATLAB applications the abstraction level of the PVM routines is too low, because they are designed to meet the requirements of classical C or Fortran programming. For example data have to be packed before sending and unpacked after receiving. If complete MATLAB data objects (matrices, cell arrays etc.) should be passed, all components have to be packed and unpacked separately, because PVM supports these operations only for primitive data types.

A suitable interface for developing distributed and parallel MATLAB applications is provided by the DPHIGH Toolbox. Due to this interface MATLAB data objects can be sent and received directly (*array-passing*). The entire buffer management as well as the data packing and unpacking is done implicitly. Additionally, the DPHIGH Toolbox contains routines for starting up and terminating MATLAB instances.

Especially during the prototyping phase the long startup times of MATLAB instances (in the range of several seconds) can disturb the interactive way of working. To solve this problem the DPMM Toolbox provides methods to manage *Parallel MATLAB Machines*. A MATLAB machine consists of several MATLAB instances, which are started only once.

On a running DPMM distributed and parallel applications can be started very fast and multiple times.

Due to the high abstraction of the DPHIGH and DPMM routines and the MATLAB usual interactive way of working, the implementation and test of distributed and parallel applications is a lot easier than using PVM directly with Fortran or C.

The DP Toolbox has been used for the following applications by the authors:

- *parallel processing: solution of the test problems published in [4] (monte-carlo study, integration of coupled ODEs, solving PDEs); stability analysis of linear uncertain systems by convex decomposition; transaction-oriented simulations*
- *distributed processing: supervisory control of an automated chemical analytic laboratory; severeal couplings of MATLAB with external programs*

Other institutions have used the toolbox for parallel evolutionary optimizations and for distributed simulations.

Public domain distributions of the current toolbox version DP 1.4 for MATLAB 4 and 5 are available from:

http://www-at.e-technik.uni-rostock.de/dp/

ftp://ftp-at.e-technik.uni-rostock.de/pub/dp/

An updated toolbox version for MATLAB 6 will be published in the second quarter 2001.

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AnyLogic 4.0: Simulating Hybrid Systems with Extended UML-RT

We outline a modelling approach aimed to capture sophisticated interdependencies of discrete and continuous behaviors in hybrid systems. The approach is essentially a hybrid extension of widely recognized object-oriented languages UML and UML-RT. It is fully supported by a new simulation tool AnyLogic 4.0 from Experimental Object Technologies [www.xjtek.com].

Hybrid Statecharts

The concept of hybrid statecharts naturally integrating discrete logic and continuous time dynamics has been around for quite a while, see for example [1], but its commercial implementation was missing until recently.

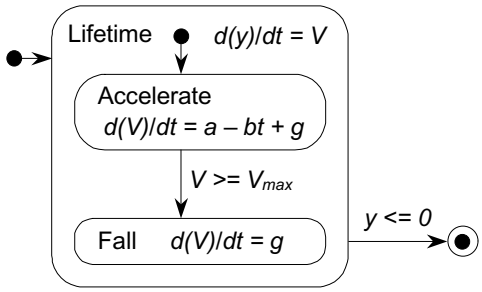

Fig. 1 : A Hybrid Statechart

In addition to standard UML attributes of states and transitions, in hybrid statecharts you can associate a set of differential and algebraic equations with a simple and/or composite state of a statechart, and you can also specify a condition over continuously changing variables as a trigger of a transition. The currently active set of equations and triggers is defined by the current simple state and all its containers.

The example hybrid statechart in Fig. 1 is a simple model of an object that accelerates vertically up until it reaches the speed of V_{max}, and then falls under the impact of gravity until it touches the ground ($y <= 0$), where it ceases to exist.

Extended UML-RT Structure Diagram

Being widely accepted as systems design standard, UML is almost ignored by professional simulation tools, partially due to their vendors' legacy problems, partially because UML so-to-say "lacks semantics" needed to generate executable models.

UML-RT, a real-time branch of UML, is better in the last respect, and it was taken as a basis for our approach. The key building block of hierarchical, object-oriented UML-RT model is active object. Objects can encapsulate other objects and host activities, e.g. statecharts, see Fig. 2. Objects interact by exchanging messages through ports and (here we extend UML-RT) by linking continuously changing inputs and outputs (in the current version these links are unidirectional).

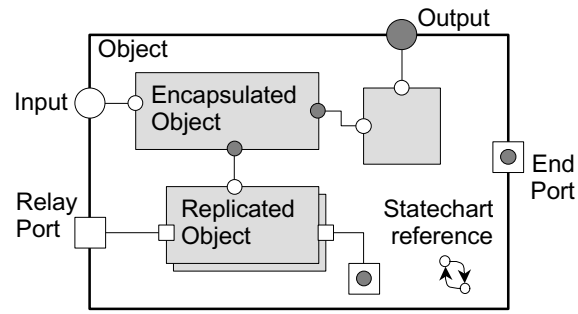

Fig. 2 : A Structure Diagram

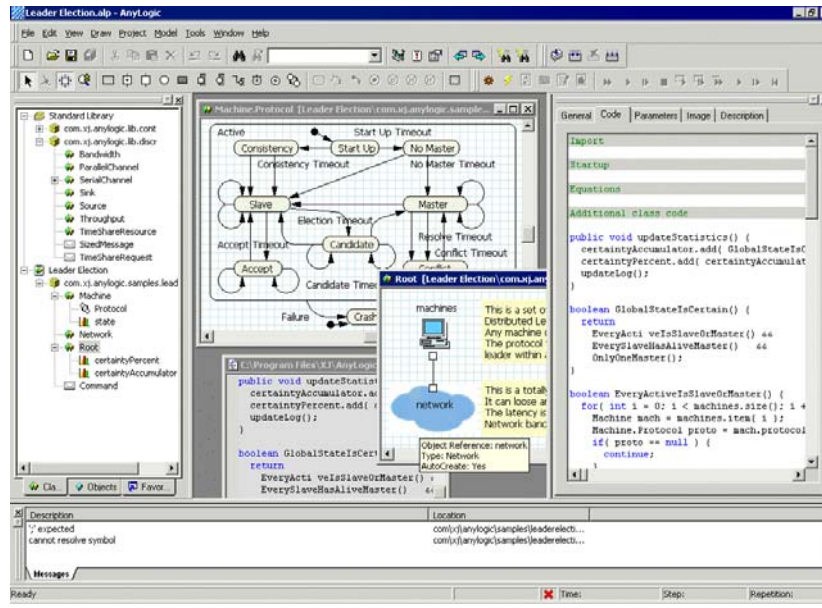

Fig. 3 : AnyLogic Model Editor

In most challenging real life systems everything is dynamic, including structure and interconnection of components. The approach we have developed and implemented captures limited lifetime and mobility of objects: objects can be created and destroyed as the system evolves, and connected and disconnected from each other dynamically.

AnyLogic Environment

AnyLogic model editor (Fig. 3) is a Windows application with complete set of UI features. Besides using graphical languages of statecharts and structure diagrams, the user can write Java code and add arbitrary Java modules: the tool is open at this level. The editor generates a 100% Java executable model, which can run over the Web.

AnyLogic allows you to debug models in terms of original diagrams. You can step, play and run the model, view objects and change variables at any level, define graphical breakpoints, etc. The debugger can connect to the model remotely via TCP.

The hybrid simulation engine of AnyLogic, also written in Java, see [2], handles dynamically changing sets of algebraic-differential equations (both stiff and non-stiff), checks their correctness, detects and breaks algebraic loops.

The preview version of AnyLogic is available at the web site

www.xjtek.com.

AnyLogic 4.0 release version contains object-centric animation development facilities and optional fast native code numerical engine for Windows platform.

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Web-based course on Modelling of Multidisciplinary Systems with Simulation across the Internet

The course is an outcome of the Transnational Socrates ODL Project *RichODL -- Enriching open and distance learning by knowledge sharing for collaborative computer-based modelling and simulation.*

Participated:

- Computing and Information Centre of the Czech Technical University,
- Knowledge Media Institute of the Open University,
- Department of Mechanical Engineering of the Loughborough University,
- Robotic and Control Group of the FernUniversität Hagen,
- Control Engineering Laboratory of the Ruhr Universität Bochum,
- Institute of Automatic Control of J. Kepler Universität Linz, and
- Department of Mathematics of the Tampere University of Technology.

The main idea behind the project was to investigate the options of supporting the Web-based learning process by remote simulation software. To verify the idea, a course on unified modelling of multidisciplinary engineering systems (i.e. systems utilising effects treated traditionally by different engineering disciplines) has been developed.

The course was designed to help practising engineers and to complement traditional courses on system dynamics.

As a working horse for the entire project was chosen Dynast – a simulation software package implemented on a CTU server in Prague and freely accessible across the Internet. Dynast is capable of

- solving sets of nonlinear algebro-differential equations submitted in an implicit textual form simulating behaviour of nonlinear dynamic systems using multipole models that can be combined with block-diagrams and equations
- linearising the models and analysing them for their small-excitation transfer functions, time and frequency characteristics in a semisymbolic form
- providing a modelling toolbox for control design by Matlab, and for digital control by Simulink

The course covers two different approaches to dynamic system modelling:

- the extended Lagrange approach, and
- the generalised multipole approach

The first approach is supported in the course by a downloadable software formulating the Lagrange equations using Maple installed on the learner's computer.

The equations can be then solved either by Simulink or, across the Internet, by Dynast. The multipole approach allows for setting up very realistic models in a way based on mere inspection of the modelled real system without forming any equations or graphs.

The model of a system is formed from models of the system components in a kit-like fashion in the same way in which the real system is assembled from its components.

The component models can be formed in a hierarchical way from models of their sub-components, or they can be characterised by equations or by measured data.

The multipole system models can be simulated or analysed across the Internet by Dynast. This tool not only solves the equations representing the system models, but also formulates them automatically respecting the physical laws governing the component interactions. Thus the learners can fully concentrate on the dynamics of their system.

On the other hand, if they intend to form the equations by themselves, they can use the multipole approach to check their results.

Dynast can be used across the Internet either in a Web-based, or in an on-line mode. In the former case, any browser is sufficient for submitting the input data in a textual form.

Submitting multipole or block diagrams in a graphical form requires a browser enabling Java applets.

The schematic editor Dyncad can be then utilised for setting up the diagrams using symbols of elementary twopoles from different physical domains, transducers and blocks as well as using library or user-defined symbols of more complex submodels.

Dyncad converts diagrams into the Dynast input language and sends the data to Dynast across the Internet. Learners can open their private accounts in Dyncad and store there their simulation problems. Their diagrams will be then sent to them in PostScript by e-mail.

Dyncad can also export Matlab M-files specifying the transfer functions of the plant to be controlled, even if it is nonlinear.

Thanks to this, the control-design procedes without any equation manipulation. In addition, a plant model implemented in Dynast can be controlled digitally across the Internet by a control structure in Simulink using its S-function.

The on-line mode assumes downloading the Dynast user environment on a PC with MS Windows. This allows for a very user-friendly work supported by dialogs, syntax analysis for any input data errors, automated documenting of simulation experiments in various formats, etc. Also the schematic editor for submitting diagrams is more comfortable there.

The course, available on

http://icosym.cvut.cz/odl/,

is accompanied by a large and open collection of multidisciplinary examples solvable across the Internet.

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Model Identification by a Demon using Stepwise Regression Procedure

The aim is to find the adequate structure of the real system investigated in order to build the model of the system. Several structures have to be tried to decide which is the nearest to reality. In our simulation system, CASSANDRA (Cognizant Adaptive Simulation System for Applications in Numerous Different Relevant Areas) [1] the demons are able to identify the structure of the model.

This system is based on very high level, so called Knowledge Attributed Petri Nets (KAPN) [2]. In the KAPN the tokens carry the variables of the system and token attributes contain the values of the variables. The examination of the interrelation between the tokens as mobile entities helps achieving the model identification. By the firing of the transitions and assigning delays to the place elements an arbitrary combination of the samples of variables can be realised.

	X1	X2	X3	X4
Year	Yield	Time	Precipitation	Temperature
1890	24,5	0	9,6	74,8
1891	33,7	1	12,9	71,5
1892	27,9	2	9,9	74,2
1893	27,5	3	8,7	74,3
1894	21,7	4	6,8	75,8
1895	31,9	5	12,5	74,1
1896	36,8	6	13	74,1
1897	29,9	7	10,1	74
1898	30,2	8	10,1	75
1899	32	9	10,1	75,2
1900	34	10	10,8	75,7
1901	19,4	11	7,8	78,4
1902	36	12	16,2	72,6
1903	30,2	13	14,1	72
1904	32,4	14	10,6	71,9
1905	36,4	15	10	74
1906	36,9	16	11,5	73,7
1907	31,5	17	13,6	73
1908	30,5	18	12,1	73,3
1909	32,3	19	12	74,6
1910	34,9	20	9,3	73,6
1911	30,1	21	7,7	76,2
1912	36,9	22	11	73,2

Table 1.

Let us see the following investigated system, where we do not know the interrelations between the components exactly. Some characteristics, as yield of corn, time, precipitation, temperature are given and we would like to predict the yield of corn. The values of yield (in bushels), precipitation (in inches), temperature (in Fahrenheit) from 1890 to 1912 in a state of the USA can be seen in Table 1. [3]

In the first step we put the values into the token attributes of the KAPN. Later we will examine the effect of the delayed input values on the response. In order to select the best regression equation we use the Stepwise Regression Procedure (SRP) [4].

The SRP is the combination of Backward Elimination Procedure and Forward Selection Procedure. The SRP starts with the correlation matrix and enters into regression the X_i variable most highly correlated with Y response.

Calculating the partial correlation coefficients (PCC) the SRP selects the X_j variable whose PCC with response is highest. Then partial F-tests for variables are used for determination of the remaining variables in the regression equation. If no more variables can enter into the regression, then the SRP terminates.

The correlation matrix gives the strength of the interrelations between the variables, the entries of the matrix are the correlation coefficients between them:

$$\text{corr\_matrix} = \begin{bmatrix} 1 & 0.38 & 0.403 & -0.357 \\ 0.38 & 1 & 0.027 & -1.129 \cdot 10^{-3} \\ 0.403 & 0.027 & 1 & -0.67 \\ -0.357 & -1.129 \cdot 10^{-3} & -0.67 & 1 \end{bmatrix}$$

$$b := \left(X^T X\right)^{-1} X^T Y$$

$$b = \begin{bmatrix} 23.552 \\ 0.776 \end{bmatrix}$$

The greatest absolute value of the 1st row (corresponding to the response) is 0.403 in the 3rd column, so the first variable in the regression will be X_3 (precipitation). Let X matrix be the augment of X_0 (same 1 vector) and X_3, let Y vector is X_1 (yield). The coefficients of the regression equation:

$$\text{residual} := Y - b_0 - b_1 \cdot X3$$

The residual is the difference of the original response and the calculated response by the regression equation. The standard error is 0.294; the result of the F-test is 6.965. Since 6.965 is greater than 2.859 (90% significant value), so the variable is acceptable in the regression. The variable from others will be entered into the regression, where the corresponding partial correlation coefficient is the greatest.

Since $r^2_{12.3}$=0.163 and $r^2_{14.3}$= 0.017, therefore the X_2 is to be entered into the regression. The calculated response by the new regression equation is: Y_c = 21.074 + 0.145 X_2 + 0.757 X_3

The partial F-test of X_2 variable is 6.801, in case of X_3: 7.696. As both are greater than the limit, that is why the procedure will be continued by the last variable: X_4. The new regression equation is:

Y_c = 53.538 + 0.146 X_2 + 0.537 X_3 - 0.405 X_4

The partial F-test of X_2, X_3, X_4 variables are 6.865, 3.854, 1.436 respectively. The last value is smaller than the limit, so X_4 variable is rejected from the regression. All the variables are examined, at the end of the procedure the following variables remain in the regression: X_2, X_3. The standard deviation of the residual is s=3.758.

In the second step we examined the interrelation between the actual response and the previous precipitation as well. The retardation can be solved by modification of the place delay time in the KAPN. The demon is able to modify any transition or place parameter, so the delay time of the place as well. In that case when the delay time is increased by 1, the tokens delayed in the place represent the previous precipitation values, the actual values in this case would be ignored.

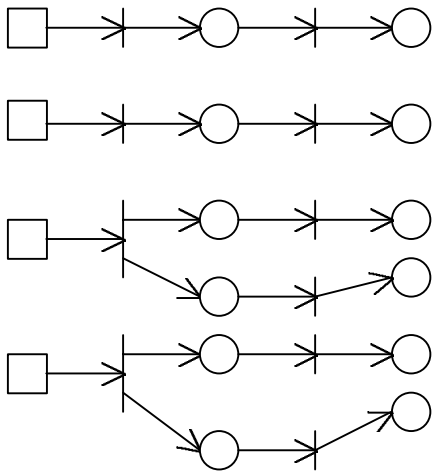

Figure 1.

We can take notice of both actual and previous values by 2 places, where the first one represents the actual values, the second place with larger delay time solves the retardation. The 2nd place is in reserve at the beginning of the simulation and the demon connects it into the model after the first step.

In the 3rd step one more variable is taken into consideration, previous temperature values are examined as well. (See Fig. 1.) After the whole procedure we get the same regression equation as calculated above.

Conclusion

According to the best solution found, the yield depends on the time and the precipitation, so there are 2 connections in the structure of the model. The functional equation between the response and variables is: 21.074 + 0.145 X_2 + 0.757 X_3. In this case the original and retarded temperature is irrelevant. The time variable, which causes the increasing of the yield, represents the technological development. It can be divided into different procedures like fertilization, weed and pest killing, plant sublimation etc. and their effects can be examined separately. The calculated (Y_c) and real response (Y) are shown in Figure 2. This experiment is intended only to show the applicability of the methodology. To apply it in practice obviously more detailed models are required.

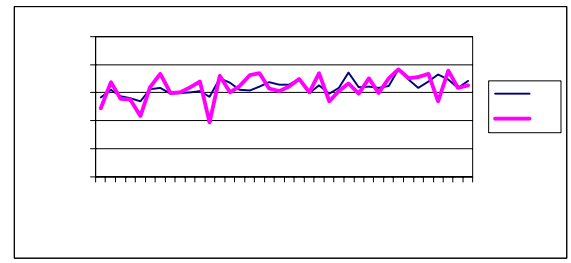

Figure 2.

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INTSCHED - an Intelligent Module for Dynamic Production Planning and Scheduling in Flexible Assembly Systems

Summary

In this note INTSCHED, an intelligent module for control platform software is presented, which supports the optimization of dynamic planning and scheduling. The module consists of several input, output, communication and analyzing modules (given in the follwing figure).

The central role of INTSCHED plays the optimizer, which works out in combination with several other modules the best solution for the predefined manufacturing problem. The optimizer makes of genetic algorithms and other heuristics.

INTSCHED supports the operator of the control platform in difficult situations and helps him to improve his decisions in critical but realistic problems.

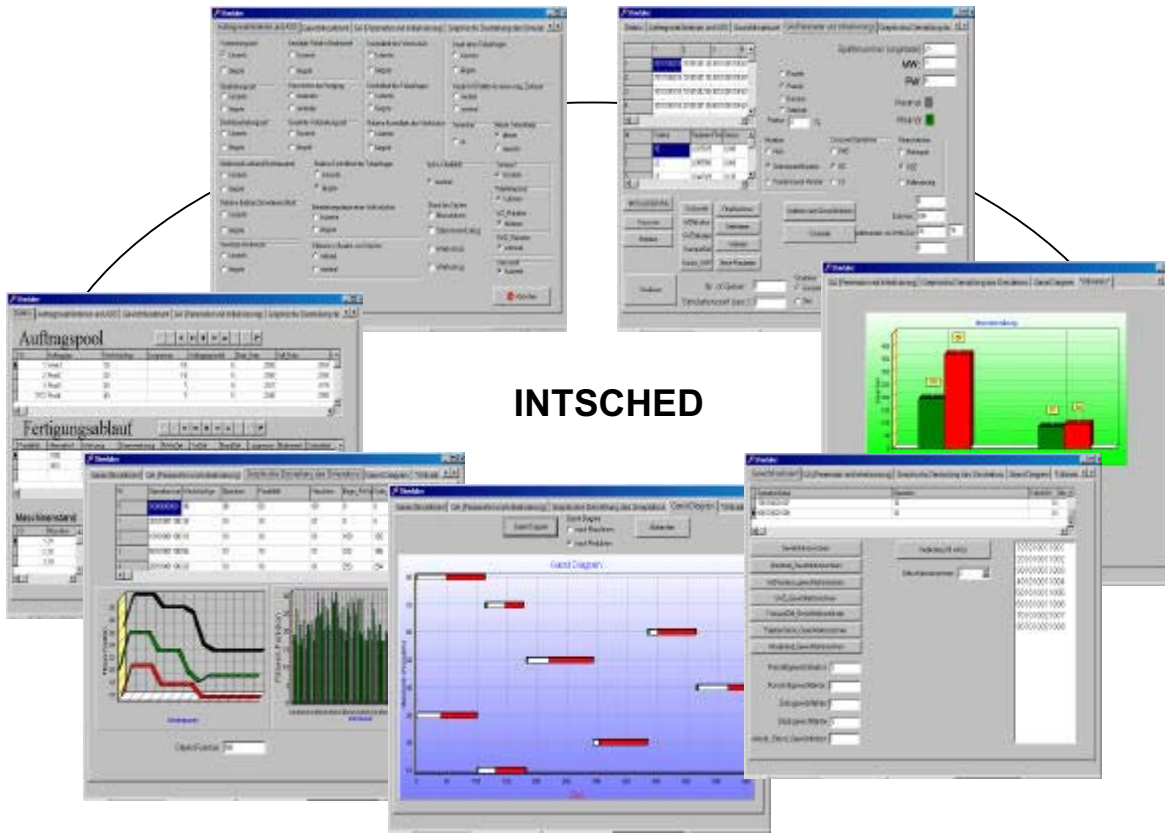
Goals of INTSCHED

The efficiency of FS (flexible systems) directly depends on the quality of ideas and intelligence which are implemented in the FS during design. This is the unique medium which ties together all the operational functions and activities that are completed by different components of systems inside of FS with limited resources and with a a lot of bottlenecks.

An optimization of the efficiency has to take into the consideration three main parameters:

- *the structure and functionality of FMS,*
- *the actual state of the FS,*
- *and the scheduling procedures*

For efficient scheduling of a FS it is necessary to design and implement intelligent tools for optimization of the FS's working scenarios and to solve the conflict situation in an intelligent way. Scheduling problems for a complex FS is a extremely complex combinatorial optimization problem, because several different constraints may be relevant in realistic problem situations.



These situations are e.g.:

- *alternative process plans for the manufacturing of a product,*
- *specialized production structures,*
- *actual state of the FS,*
- *free and reserved resources of system during the time planed,*
- *the criterion of planning, etc.*

The scheduling problem can be formulated as a multi-objective problem with the objectives of minimizing the total processing cost, and these criteria will simultaneously optimize the process planning and the scheduling of the order, both implemented in INTSCHED.

INTSCHED is designed as interactive support system for system operators of FSs. The operator will be supported during:

- Diagnostics wrt machine tools diagnostics, equipment diagnostics, orders execution diagnostics, tool and system diagnostics, etc.,
- Optimization during the scheduling planning,
- Projection of alternative virtual scenarios,

Working scenario in INTSCHED

First the selected orders will be assigned to an installation (each order has got a priority), whereby at once the proportional possibilities and their allowable combinations are determined - in order to start optimization by means of genenetic algorithms or by heuristic algorithms.

The operator of the control platform initializes an "population" of orders and gives the time interval as a stopping criterion.

Than during this interval the genetic algorithm in combination with multi-critera heuristics generates and optimizes production plan.

The fitness function for the optimization of the scheduling is a complex function which various criteria. Two kinds of fitness functions are used in the INTSCHED system:

- The first fitness function is a weighted total evolution where a lot of simple criteria (priority, setup time, process time, start date, duo date, actual state of FS, minimizing flow tools, minimizing AGV routs, etc) are included.
  There are implemented 47 different criteria. The criteria can be applied as single citerion or in combination; depending on the state of the FS, whereby an expert operator will design the best strategy for scheduling.
- The second fitness function can be used as a objective function.
  Here there are a lot of objective functions which can be used as fitness functions:
  balancing machines, minimizing flow times, minimizing total number of reject, minimizing makespan (completion time for the last job), minimizing total processing cost, etc.

The result of optimization is a (sub)optimal order. This order will be build into scenarios, i. e.

- *into a virtual scenario in the case of simulation (off-line),*
- *or into a working scenario of FS in case of scheduling planning (on-line).*

The results obtained from scheduling planning provide data which build the relevant queues. The queues determine the operation sequences on machine tools, the flow of pieces, the tool flow and the sequence of set-up activities.

The necessary data containing the information on the state of the FS system can be transferred directly over information-flow structure of FS. Specific data can be given to the module in one interactive dialogue with the operator or over intelligent sensor system.

Advantages and Availability

The implementation of INTSCHED has the following advantages:

i. it can find a high-quality scheduling, because here are implemented several optimizations techniques,
ii. it is very flexible to connected with other software like SAP,
iii. it can directly connected with external data base so productions planing with scheduling can be integrated, and
iv. over special interfaces it can in real time directly get the real state of each FS subsystem so it can be used as real-time optimizer of complex FS dynamic scheduling.

INTSCHED has been tested within the three flexible systems: flexible manufacturing system, flexible assembly systems for numberd lists

INTSCHED is programmed in C, testversions are available on request. For further information contact website http://www.argesim.org/projects/intsched/.

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SIMULATION CENTRES

Department of Automatics, Biocybernetics and Robotics, Institute Jozef Stefan, Ljubljana

Department of Automatics, Biocybernetics and Robotics is an intedisclipinary group of researchers specializing in electrical, mechanical and biomechanical engineering, computer sciences and applied mathematics.

The department is engaged in three basic activities: research, development and education. The research in the department is dedicated to the robotics and introduction of flexible automation in the industry, and to the biorobotics and biocybernetics.

A wide range of research activities is covered, from basic and applied research to the development of technologies and systems. Most of the research topics are connected to the so-called "movement of man and machine". Our approach is to investigate the problems that arise in industry or medicine and to transfer the results into practice.

The activities of the department are divided into two research laboratories: the Biocybernetics Laboratory and the Robotics Laboratory.

The Biocybernetics Laboratory

The primary interest of the biocybernetics laboratory is the restoration of the human locomotion by using functional electrical stimulation (FES) of extremities.

The principle of FES is that the application of pulse electrical currents to the nerve or the muscle can cause muscle contraction. This phenomena can be used in patients whose muscles are intact, but deprived of central nervous control from various causes.

The Biocybernetics Laboratory follows three main lines of research. The first is the application of multichannel transcutaneous FES in hemiplegic patients, for faster and improved gait re-learning and rehabilitation, the second line is the development of a dual-channel implantable system for correction of gait, and the third is the application of FES to assist ventilation in high level spinal cord injury patients.

To enable the rapid transfer of new findings from research to the patient, a specialized production unit has been founded, which manufactures over 10 different FES devices.

In the area of biocybernetics, measurement of movement, kinetic and kinematic variables is one of the most important issues.

In the Technological Centre for Analysis and Synthesis of Human Motion, which operates within the Laboratory, different measuring instruments and techniques have been developed and applied, especially in orthopedics.

The Robotics Laboratory

The main research topics in the field of robotics are: the kinematics and dynamics of robotic mechanisms, simulation and control of robotic systems, motion planning, redundant mechanisms, and mobile robots.

A great deal of work has been dedicated to the mathematical modelling of the robot kinematics and investigation of the robot workspace characteristics.

Efforts have been made in the sphere of robot model-based and adaptive control, and in the force control. In the last years, the work has been focused to the robot redundancy: modeling of redundant systems, redundancy resolution using different control schemes, hyper-redundancy.

In in the field of biorobotics the research activities are associated with the development of the humanoid robot. This is nowadays a very popular topic worldwide.

We are primarily interested in the role of shoulder girdle in human manipulation and how to incorporate this strategy in an artificial shoulder. Beside this, we investigate the kinematics and redundancy of human arm, especially the human arm self-motion properties in the different regions of the workspace.

An important objective of the Robotics Laboratory is also the development of advanced robotics and automation systems, and the introduction of computer-aided technologies, mathematical modelling and simulation in both the industry and medicine.

In the past years we had different R&D projects with Slovenian industry. To facilitate the transfer of our research results to the industry a Technological Centre for Advanced Manufacturing has been constituted within the Robotics Laboratory.

The role of simulation

Simulation has been recognized as an important tool in designing new products, investigating its performances and also in designing applications of these products. Simulation allows us to study the structure, characteristics and the complexity of the system under investigation increases the role of the simulation becomes more and more important.

Hence, the modelling and simulation are indispensable in our work. In the field of robotics we use the simulation for analysis of kinematics and dynamics, off-line programing, control design, and for design and testing of robotized cells. For that purpose we use different modelling and simulation tools.

The most used tool is Matlab/Simulink, which is used for modelling and simulation of robotics systems, and for analysis and visualization of measurement results.

For robotic systems we have developed Planar Manipulators Toolbox (implemented in Matlab), a tool for analysis, design and testing of control algorithms for robotic manipulators especially for the redundant manipulators. The system enables also real-time simulation and hardware-in-the-loop simulation, where a real redundant robotic manipulator is part of the simulation loop.

The integrated environment has proved to be a very useful and effective tool for many purposes: kinematic and dynamic simulation, analysis and synthesis of control systems, trajectory generation, etc.

During last two decades we have developed also other stand-alone simulation packages for geometric modelling, 3D representation, simulation of dynamic systems, etc. Beside these tools and Matlab we use also other commercial simulation packages like RobCAD for simulation of workcells and i-Deas for mechanical design.

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MEDISIM – Vienna
The Austrian Research Centre Seibersdorf and SIMTECH / ARGESIM

In 1996 the Department of Simulation, TU Vienna (SIMTECH / ARGESIM) and the Group for Medical- and Rehabilitation Engeneering of the Austrian Research Centre Seibersdrof (ARCS) started a cooperation in the field of modelling and simulation in physiology. The goal was - and is - to achieve new insight about medical aspects on the one hand, and to investigate new modelling approaches.

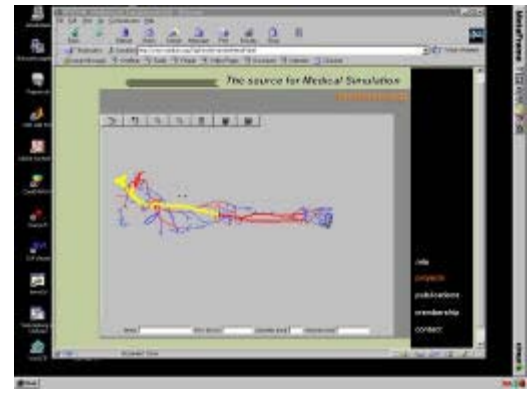
SETUP: The working group is formed from ARCS by Martin Suda and from SIMTECH/ARGESIM by Christian Almeder, Michael Wibmer, Sigfried Wassertheurer and Niki Popper.

Since 2000 a 3rd partner joined the partnership: The University of Idaho. With Boris R. Bcacio an electrical engineer tries to improve the Hardware knowledge of all participants, but especially for mathematicians with different success.

Arterial Blood Flow

Two different models for the blood flow through an arterial network were the outcome of this project. The first one is a hydrostatic model for the average flow and pressure values within the network, i.e. the model can achieve insight about the general blood flow situation and the blood supply of specific regions. It is capable of being identified individually for each patient with a minimum amount of work.

This model was implemented as a part of a software package, which includes also a graphical editor for manipulating the network and analyzing tools to perform different types of simulation experiments. This program is already in use by some physicians for research work.



The second model is a further development towards a hydrodynamic approach. It allows to simulate the pulse wave propagation within the arterial network.

For calculating the pulse wave propagation along the vessels the one-dimensional equation of motion and equation of continuity for elastic tubes are solved using the methods of characteristics. Due to the complexity of this one, it is a difficult task to obtain individual patient data, but it is designed for principal investigations of pathological pulse forms.

The developer of both models was honored to receive his PhD from the hands of Austrian President Dr. Thomas Klestil in 2000 for extraordinary performances in his work.

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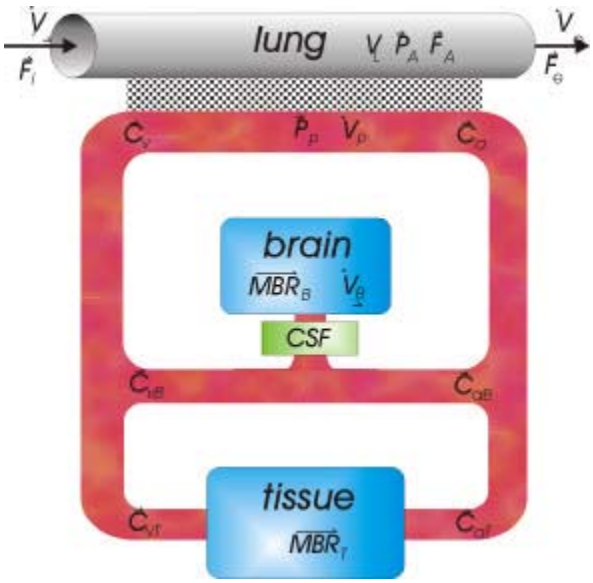
Respiratory System

The structure of the respiratory system, as it is implemented with two compartments, brain and tissue, is shown on fig. 1.



Main research topics in this area are the improvement of the compartment model of the respiratory system, the development of a multi-compartment model of the lung, a new model of the perfusion of the lung and improving the controller – the second part of the complete model - using different parameters to create a specific pattern of breathing.

Data used for the testing and improvement of the models will now also include Nasa informations gained at the crewed spaceflights of the last decades. On the one hand the models can be adapted for "not everyday" parameter sets, on the other hand the models can be tested for the clinical use.

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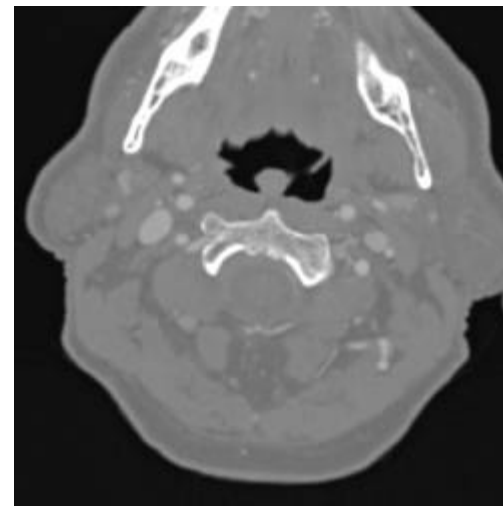
Reconstruction of the Vascular Network from Image Processing Systems

In Cooperation with the Section for Conservative Radiology at the AKH Vienna one of the main goals is to adapt models for the clinical use. How can models be parameterized for individual patients? Segmentation algorithms are used to produce an exact model of the arterial network of a patient.



At the moment MRI data, according to the international standard format dicom, is processed. A first paper will probably be published in late summer or fall 2001.

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Benefits for the students

The Austrian Research Centre Seibersdorf cooperates with the TU Vienna by granting scholarships, providing infrastructure and handles the public relations. And the University tries to pay back by giving ambitious, young researchers the chance to develop their first professional models. In cooperation with the University of Idaho the possibilities of exchange programs will be expanded in 2001.

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EUROSIM SOCIETIES

EUROSIM

EUROSIM, the Federation of European Simulation Societies, was set up in 1989. The purpose of EUROSIM is to provide a European forum for regional and national simulation societies to promote the advancement of modelling and simulation in industry, research, and development. EUROSIM members may be regional and/or national simulation societies. Full membership and observer membership are available.

At present EUROSIM has ten full members and three observer members: ASIM – Arbeitsgemeinschaft Simulation (Austria, Germany, Switzerland), CROSSIM – Croatian Society for Simulation Modelling (Croatia), CSSS – Czech & Slovak Simulation Society (Czech Republic, Slovak Republic), DBSS – Dutch Benelux Simulation Society (Belgium, The Netherlands), FRANCOSIM – Société Francophone de Simulation (Belgium, France), HSS – Hungarian Simulation Society (Hungary), ISCS – Italian Society for Computer Simulation (Italy), SIMS – Simulation Society of Scandinavia (Denmark, Finland, Norway, Sweden), SLOSIM – Slovenian Simulation Society (Slovenia), UKSIM – United Kingdom Simulation Society (U.K.). AES – Asociación Española de Simulación (Spain), PSCS – Polish Society for Computer Simulation (Poland) and ROMSIM (Romanian Society for Modelling and Simulation) are observer members.

The EUROSIM Congress is arranged every three years in Europe. The 4th EUROSIM congress will take place in Delft, The Netherlands, June 26-29, 2001.

EUROSIM is governed by a Board consisting of one representative of each member society, plus the organizer of the last and next EUROSIM Congress (past president and president).

At the EUROSIM'98 Congress the Board elected new officers for a three years period beginning on July 1, 1998: L. Dekker (DBSS) – president, K. Juslin (SIMS) – past president, A. Javor (HSS) – secretary, Y. Hamam (FRANCOSIM) – treasurer.

EUROSIM societies are offered to distribute to their members the news journal Simulation News Europe (SNE) as official membership journal:

http://www.argesim.org/sne

Furthermore members can subscribe the scientific journal Simulation and Modelling, Practice and Theory (SIMPRA) at a significantly reduced price:

http://www.elsevier.nl/locate/simpra/

More information ma be found at EUROSIM's WWW Server:

http://www.eurosim.org/

Letter of the President

First of all I would like to congratulate prof. Felix Breitecker and his editors with the last number of our newsletter. The new outfit looks really nice and surveyable and contains a lot of valuable and useful information.

Via this letter I would like to thank once more mrs. Irmgard Husinsky, for her outstanding work she did for many years for the EUROSIM Federation, especially for SNE. I wish her success in her new job at the IT Services at TU Vienna.

I would like also to take the opportunity to thank professor Granino Korn for his work he has done for the SIMPRA journal. For personal reasons he has quited our Board recently.

I am pleased to inform you that the organisation of the EUROSIM 2001 Congress is progressing well. Please, visit regularly the Congress web site, where you can find all relevant, updated information. We hope that many EUROSIM members will attend our triannual Congress in June in Delft. The registation form is listed on the site and the deadline for early registration is May 1st, 2001.

The Board meetings of EUROSIM are, in principle, taking place the day before the Congress, so June 25, 2001. The Board members will be informed about place and time by separate mail.

In Prague, during the Executive Board meeting and the Editorial Board meeting of our journal, the name of the journal has been discussed, as well as the aims and scope and the possibility of submission of short papers (papers in a letter format).

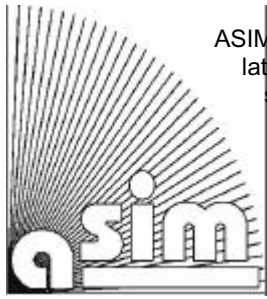
The new name of the journal will become Simulation and Modelling, Practice, and Theory; the abbreviation SIMPRA will be maintained. The text for the new aims and scope and the text and instructions for short paper submission are in preparation and will be published in the journal as soon as possible and will also be published in the second issue of the SNE newsletter this year.

During the Congress in Delft the new President, prof.dr. Alex Hamam from FRANCOSIM, will be officially elected for the next period. I wish him success in leading our Federation.

Len Dekker, President

ASIM

Arbeitsgemeinschaft Simulation



ASIM (Arbeitsgemeinschaft Simulation) is the association for simulation in the German speaking area. ASIM was founded in 1981 and has now about 700 individual members, and 30 institutional or industrial members.

News from the ASIM board

The ASIM board met in December 2000 at University Hannover.

First Prof. Breitenecker, ASIM president, reported on the re-organisation of the working groups and on the status of the publications (new folders available).

Main discussion points were: conference ASIM 2001, other conferences to come, the activities of the working groups, ASIM publications, co-operation with SCS Europe and some organisational issues.

Furthermore it was decided to award the honorary membership to Mr. A. Kuhn (Dortmund) and Mr. P. Lorenz (Magdeburg). For awards for i) personal services in ASIM, ii) personal services in simulation, and iii) industrial or institutional services in simulation (as decided at the last board meeting), rules will be elaborated by Mr. D. Möller, ASIM vice president.

The evaluation of the joint conferences ASIM'2000 and ESS'2000 in Hamburg was discussed: There were some organisational problems especially in communication, because the conference organisation of SCS Europe BvbA is different to the organisation of ASIM conferences.

ASIM and SCS Europe will continue the co-operation at conferences based on co-sponsoring of ESM and ESS conferences. Some organisational problems are to be solved, e. g. the co-operation with local chairs and conference fees (at ASIM conferences e.g. due to voluntary work and support from university infrastructure conference costs can be much lower).

With respect to international simulation conferences, the board underlined again,

i. that the competition of too many simulation conferences around the EUROSIM congress 2001 in June 2000 is contra-productive (ASIM is not happy about the organisation of the *2001 European Simulation Interoperability Workshop*, June 25 - 27, 2001 by SCS Europe)
ii. and that the EUROSIM congress should be scheduled in September (as from 1986 - 1995) in order to have more ASIM participants (in June there are no university holidays, furthermore end of June / begin of July exams are scheduled).

The boarded welcomed the progress in the publication of the joint series with the SCS Europe Publishing House.

The board will meet again end of April 2001 in Paderborn.

Co-operation ASIM – UKSIM

ASIM and UKSIM have decided to improve their co-operation in the European area and to set up a price for young researchers in simulation technique.

ASIM und UKSIM will draw their attention onto a better schedule for simulation conference in Europe and will try to get (significant) reduction of conference fees, especially for young researchers.

A young researchers price will be awarded for new methods in, or applications of simulation technique. Yearly the best contribution of a young researcher will be presented alternatively at the annual ASIM conference or at the UKSIM conference, or at an international conference related to one of these conferences. The price was drawn first time in 2000, on the occasion of the ASIM conference ASIM-2000 (jointly with the ESS'2000) in Hamburg, and the second recently at the UKSIM'01 conference in Cambridge

Publications

ASIM co-operates with SCS Europe and with ARGESIM (TU Vienna) in publication of two book series:

- *ASIM/SCS book series „Fortschritte in der Simulationstechnik – Frontiers in Simulation"*
- *ASIM / ARGESIM / SCS book series „Fortschrittsberichte Simulation – Advances in Simulation"*

Furthermore, the ASIM working groups report in so-called "ASIM Mitteilungen" about their meetings, about special developments, etc - either as ASIM self-publication or as publication is series of other publishers (e.g. ARGESIM Reports).

ASIM/SCS book series „Fortschritte in der Simulationstechnik – Frontiers in Simulation"

New Working Group Status Report. In March 2001 the new book „Simulation Technischer Systeme - Berichte aus der Fachgruppe" (in German Language) has been published (editor: Ingrid Bausch-Gall).

Each of the 10 authors (author groups) is very experienced in the specific area and all authors work for industrial companies or have a strong industrial background.

The authors report in detail about one of their current simulation application. App. 280 pages, 41 Euro for ASIM/SCS members, 51 Euro for others + mailing.

Also available in these series are other staus reports (monographs) of ASIM working groups and the Proceedings of the annual ASIM conferences:

- *Proceedings of „Simulationstechnik – 13. Symposium in Weimar", Sept.1999 (editor: Georg Hohmann). ISBN 1-56555-130-3, 476 p., 60 Euro (ASIM/SCS members), 120 Euro (others) + mailing.*
- *„Modellierung, Simulation und Künstliche Intelligenz" (editors: Helena Szczerbicka, Thomas Uthmann). ISBN 1-56555-128-1, 471 p., 58 Euro (ASIM/SCS members), 116 Euro (others) + mailing.*
- *„Referenzmodelle für die Simulation in Produktion und Logistik" (editor: Sigrid Wenzel). In this multi-expert compendium a survey is given on common „reference models" in various fields of application, processes an structures. ISBN 1-56555-182-6, 281 p., 45 Euro (ASIM/SCS members), 90 Euro (others) + mailing.*
- *Proceedings "Simulationstechnik – 14. Symposium in Hamburg September 2000" (editor Dietmar P. F. Möller, ISBN: 1-56555-189-3, 560 p, 60 Euro (ASIM/SCS members), 120 Euro (others) + mailing*

All books may be ordered from ASIM (Ingrid Bausch-Gall, Munich, Tel.: +49-89-3232625, Fax: +49-89-3231063) as well as from SCS Europe Publishing House (Rainer Rimane, Erlangen, Tel./Fax: +49-9131-66247), or via email (admin@asim-gi.org, rimane@informatik.uni-erlangen.de) or online via: http://www.asim-gi.org/publikationen/, http://hobbes.rug.ac.be/~scs/

ASIM / ARGESIM / SCS series Fortschrittsberichte Simulation - Advances in Simulation

This series is open for publication of PhD theses, habilitations, software guides, etc.

While the series „Advances in Simulation" is similar to „Frontiers in Simulation" with respect to layout and printing, the series „Fortschrittsberichte Simulation" is a low-cost series with special offers for bulks.

New books are available in this series:

- S. Pawletta: Erweiterung eines wissenschaftlich-technischen Berechnungs- und Visualisierungssystems zu einer Entwicklungsumgebung für parallele Applikationen, ISBN 3-901608-57-5
- Ch. Almeder: Hydrodynamic Modelling and Simulation of the Human Arterial Bloodflow; ISBN 3-901608-58-3
- Th. Preiß: Relationale Datenbanksysteme als Basis für Modellbildung und Simulation von kontinuierlichen Prozessen, ISBN 3-901608-59-1

All these books may be ordered from ASIM.

Reports from the working groups

Most ASIM working groups meet in spring 2001. Detailed reports about the meetings will appear in the ASIM Nachrichten.

Working groups GMMS (Methods in Modeling and Simulation) and **STS** (Simulation of Technical Systems) held a common meeting on March 5th and 6th in Dresden at the Fraunhofer-Institut. The very interesting program included user group meetings (SPICE, MATLAB), presentations and discussion rounds on modelling methods, automotive simulation, VHDL-AMS and hydraulic simulation.

The program included a visit of the Dresdner Frauenkirche, which is under construction and will soon be opened again and a dinner on Monday evening.

For more information visit the homepages of the working groups:

www.gmms.asim-gi.org
www.sts.asim-gi.org

Working group SKI (Simulation and Artificial Intelligence) and SUAW (Simulation of Environmental Systems) met from 25th to 27th March at University of Muenster. The workshop focussed on simulation methodology and simulation and AI, especially in the application for Geoinformatics.

Working group SPL (Simulation in Production and Logistics) met on March 22nd on the first day of the Conference „Simulation und Visualisierung" in Magdeburg.

The next conference will be on March 6 -8, 2002 at University of Duisburg. A conference invitation can be obtained from Prof. Bernd Noche, b.noche@uni-duisburg.de.

For more information visit the homepage of the working group: www.spl.asim-gi.org

Working group contacts

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http:// www.sts.asim-gi.org

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SBW *Simulation in der Betriebswirtschaft*
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http://www.asim-gi.org/sbw

SVS *Simulation von Verkehrssystemen*
(Simulation of Transport Systems)
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Fax: +49-89-3231063
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WWW-Information: http://www.asim-gi.org/
Email: info@asim-gi.org (for information)
admin@asim-gi.org (for administration)

ASIM meeting and conferences to come

7.6. – 9.6. 2001 ***ESM 2001*****,** *European Simulation Multiconference,* SCS Europe**,** ASIM co-sponsor**,** Prag; Info: http://hobbes.rug.ac.be/~scs/

26.6. – 29.6. 2001 ***EUROSIM'2001*** *EUROSIM's Simulation Congress*; EUROSIM, ASIM co-organiser*;* Delft: Information: http://www.ta.twi.dudelft.nl/PA/EUROSIM2001

11.9. – 14.9. 2001 ***ASIM 2001*** *15. Symposium Simulationstechnik,* Paderborn. Information: F. Dörrscheidt,

October 2001 ***ESS 2001*** *European Simulation Symposium,* SCS Europe, ASIM co-sponsor, Marseille, Info: http://hobbes.rug.ac.be/~scs/

11.3. – 13.3. 2002 ***ASIM SBW 2002*** *18. Symposium "Simulation als betriebliche Entscheidungshilfe",* Braunlage, Harz. Information: U. Müller, FG SBW

6.3. - 8.3. 2002 ***ASIM SPL 2002*** *10. ASIM-Fachtagung "Simulation in Produktion und Logistik", Info FG SPL*

September 2002 ***ASIM 2002*** *16. Symposium Simulationstechnik,* Rostock.

ASIM - Buchreihen / ASIM Book Series

Reihe **Fortschritte in der Simulationstechnik** / Series **Frontiers in Simulation**

kürzlich erschienen / appeared recently:

- G. Hohmann (Hrsg.): *13. Symposium Simulationstechnik*, Weimar, Sept. 1999
- D. P. F. Möller (Hrsg.): *14. Symposium Simulationstechnik*, Hamburg, Sept. 2000
- H. Szczerbicka, T. Uthmann (Hrsg): *Modellierung, Simulation und Künstliche Intelligenz*
- S. Wenzel (Hrsg.): *Referenzmodelle für die Simulation in Produktion und Logistik*
- I. Bausch-Gall (Hrsg.): *Simulation technischer Systeme – Stand und Entwicklungen*

Schwerpunkte / Topics:

- Statusberichte über Simulation in den ASIM Fachgruppen / Status reports
- Allgemeine Monographien / General monographies
- Proceedings der ASIM Tagungen / Proceedings of the ASIM conferences

Reihe **Fortschrittsberichte Simulation / ARGESIM Reports** Series **Advances in Simulation**

kürzlich erschienen / appeared recently:

- S. Pawletta: Erweiterung eines wissenschaftlich-technischen Berechnungs- und Visualisierungssystems zu einer Entwicklungsumgebung für parallele Applikationen
- Ch. Almeder: Hydrodynamic Modelling and Simulation of the Human Arterial Bloodflow
- Th. Preiß: Relationale Datenbanksysteme als Basis für Modellbildung und Simulation von kontinuierlichen Prozessen

Schwerpunkte / Topics:

- Spezielle Monographien (Dissertationen, ...) / Special monographies (PhD-thesis, ...)
- Erweiterte Berichte der ASIM Fachgruppentreffen / ASIM Workshop proceedings
- Handbücher für Simulationssprachen / User Guides for simulation languages

Preis / Price: DM 40.- (ASIM-Mitglieder DM 30.-) + Versandkosten

Bestellungen, Informationen für Autoren / Orders:

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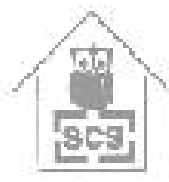
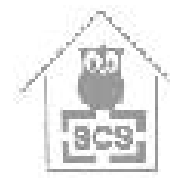
Fax: +49-89-3231063,

or online - Email: info@asim-gi.org - www.asim-gi.org/publikationen

or via SCS European Publishing House: http://hobbes.rug.ac.be/~scs/pub





ASIM 2001

15. Syposium Simulationstechnik,
Paderborn, Sept. 11 - 14, 2001

ASIM 2001 will take place from September 11-14 at the University of Paderborn. Chair of the organizing committee is Prof. Dr.-Ing. Frank Dörrscheidt (department of control engineering).

All aspects of modelling and simulation will be addressed:

- Modelling and Simulation Methods,
- Simulation Hardware and Software, Simulation Tools
- Applications

The conference will start on Sept. 11th with tutorials and user group meetings. The official opening with a plenary lecture by *Prof. Dr. F.E. Cellier* (University of Arizona, USA) is on Sept. 12th. The program in the following includes: overview presentations, parallel sessions with presentations and discussions, industry sessions and workshops. A poster exhibition and an exhibition of simulation software and hardware will be open on all days.

Social program. The social program starts with a welcome party on Sept. 11th and is continued on Sept. 13th with two excursions. The first one leads to the company HELLA, one of the largest suppliers for car lighting equipment, the other one is a visit of the Nixdorf computer museum.

Here the participants are invited to go on an exciting journey through time and take a look at the fascinating past, present and future of information technology. A dinner in a small historic village will close the program of the day.

Location. The 1200-year old city of Paderborn with its 140,000 inhabitants is located in the middle of Germany and an important commercial centre of the region. The University of Paderborn was founded here in 1972 and has currently about 15,000 students. It offers a wide range of disciplines: Humanities, Social Sciences, Economics, Natural Sciences, and Engineering.

Further information can be found at

http://www-rt.upb.de/ASIM2001/
http://www.asim-gi.org/ASIM2001/

Ingrid Bausch-Gall
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CROSSIM

CROSSIM (The Croatian Society for Simulation Modelling) was founded in 1992 in Zagreb. CROSSIM is a non-profit society with the following main goals: promotion of knowledge, methods and techniques of simulation; establishment of professional standards in simulation; development of education and training in simulation; organization of professional meetings and publishing in the field; cooperation with similar domestic and international institutions. From April 1997 CROSSIM is a full member of EUROSIM.

Membership

CROSSIM currently has 68 individual members. The annual membership fee is equivalent of 15 German marks for regular members, and 5 German marks for students.

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Activities

- Co-organizing the 23rd International Conference *"Information Technology Interfaces" ITI 2001,* Pula, Croatia, from June 19-22, 2000. The conference has traditionally a strong modelling and simulation session.
- Co-organizing the 3rd *European Ecological Modelling Conference* to be held in Croatia during September 2001.
- Regularly organizing a simulation seminar and workshops held at the Faculty of Economics, University of Zagreb. Members are encouraged to exchange experiences, discuss current problems and initiate cooperative activities.
- Work on scientific projects in discrete and continuos simulation, and applications of simulation in such diverse fields as engineering, economy, medicine, ecology etc.
- Publication of papers in international and domestic journals and conference proceedings.
- Cooperating in publishing CIT a Journal of Computing and Information Technology. Preparing a booklet about the CROSSIM society
- The first WWW site in Croatian devoted to simulation was developed at the Faculty of Electrical Engineering and Computing. The address is: http://www.rasip.fer.hr/nastava/mis/. Initial WWW site is http://rudjer.irb.hr/~crossim
- CROSSIM e-mail distribution list at the Computing Centre of the University of Zagreb

Journal CIT

The aim of the international **Journal of Computing and Information Technology (CIT)** is to present original scientific and professional papers, as well as review articles and surveys, covering the theory, practice and methodology of computer science and engineering, modelling and simulation, and information systems.

Email List

CROSSIM e-mail distribution list at the Computing Centre of the University of Zagreb serves as a communication medium among members. To subscribe please send to

LISTPROC@CARNET.HR

a line of text (leave an empty subject line) SUBSCRIBE CROSSIM your name and surname.

To send e-mail to all members at one just send an e-mail to:

CROSSIM@CARNET.HR

V. Bosilj Vuksic

CSSS

General Information

CSSS (The Czech and Slovak Simulation Society) has about 150 members in 2 groups connected to the Czech and Slovak national scientific and technical societies (Czech Society for Applied Cybernetics and Informatics, Slovak Society for Applied Cybernetics and Informatics -SSAKI). The main objectives of the society are: development of education and training in the field of modelling and simulation, organising professional workshops and conferences, disseminating information to its members about modelling and simulation activities in Europe, informing the members about publishing in the field of modelling and simulation. Since 1992 CSSS is a full member of EUROSIM.

Past Event

The XXIInd International Colloquium on "Advanced Simulation of Systems" (ASIS 2000) that took place on the 11th to 13th September 2000 in Bystøice pod Hostýnem, Czech Republic, was organised by the Department of Computer Science FEEI VŠB – Technical University Ostrava and Department of Computer Science of FEECS University of Technology Brno. Technical journal AUTOMATIZACE Praha was a medial sponsor. The chairman of the international program committee was Dr. Ing. Jan Štefan. Some of the interesting point in topic were “Simulation in Hydrodynamics", "Education of Modelling and Simulation in Education" (6 subscriptions), Parallel and Distributed Simulation" (8 subscriptions), New Modelling Paradigm" (12 subscriptions), "Simulation Case Studies" (22 subscriptions). . Proceeding of the Colloquium has 380 pages, with 61 reviewed papers. Some 70 participants from Czech republic, Slovakia and Poland attended the workshop. The Colloquium was connected with annual meeting of CSSS.

The International Workshop "Methodology of Modelling and Simulation" that took place on August 30-31, 2000 Žilina, Slovak republic, was organised by the Faculty of Management, Control and Informatics, University of Žilina, Slovak Society for Applied Cybernetics and Informatics, Bratislava and CSSS . The chairman of workshop was Prof. Mikulas Alexik. The CSSS boar meeting has taken place during workshop.

The scientific conference with international participation "Electronic Computers and Informatics'2000" with a section on “Modelling and Simulation of the systems”, was held on September 28-30, 2000 in Herlany, Slovak republic. General chair of the conference was Prof Ing. Milan Jelsina Technical university Kosice, Slovak republic. 60 participants attended the workshop and 40 papers were presented.

Coming Event

The 35th International Conference on "Modelling and Simulation of Systems" (MOSIS'2001) will take place on May 9-11, 2001, Hradec nad Moravicí, Czech republic.

The Conference will be connected with two Workshops: workshop ISM’2001 -Modelling of Information System and workshop MANAM’2001 -Modelling in Manager Works. The chairman of the international program committee is Dr. Ing. Jan Stefan. For more information – jan.stefan@vsb.cz.

The 8th International Symposium „Railways on the edge of third millennium“(ZEL ’2001) will take place on May 29-30, 2001 in Zilina, Slovak republic. One of the interesting point in topic is „Simulation of Railways Stations“. The chairman of the international program committee is Prof. Ing. L. Skyva, University of Zilina.

The 24rdt International Workshop „Advanced of Simulation Systems“ (ASIS’2001) will take place in the Moravian town Velké Losiny, Czech republic on September 11-13, 2001. The chairman of the international organising committee is Dr. Ing. Jan Stefan. The workshop will be connected with annual meeting of CSSS.

The International Workshop “Modelling and Simulation in Management, Informatics and Control” (MOSMIC'2001) will take place on October 9-10, 2001 in Zilina, Slovak republic. The chairman of the work-

shop is Prof. Mikulas Alexik. The workshop will be connected with meeting of CSSS Steering Committee.

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DBSS

General Information

The Dutch Benelux Simulation Society (DBSS) was founded in July 1986 in order to create an organisation of simulation professionals within the Dutch language area. DBSS has actively promoted creation of similar organisations in other language areas.

DBSS is a member of EUROSIM and works in close cooperation with its members and is further affiliated with SCS International, IMACS, the Chinese Association for System Simulation and the Japanese Society for Simulation Technology.

Membership

Both corporate entities (companies, institutes, etc.) and individuals are welcome to join DBSS as full corporate or individual member.

The contribution is divided in two options:

I. Dfl. 75,- individual member or Dfl. 150,- institutional member, which means that you will receive the newsletter Simulation News Europe three times a year.

II. Dfl. 150,- individual member or Dfl. 250,- institutional member, which means that you will receive the Journal Simulation Practice and Theory eight times a year, and the newsletter Simulation News Europe three times a year.

Becoming member of DBSS includes automatically being member of EUROSIM, the overall organisation of European Simulation Societies. DBSS members enjoy reduction of the fees attending the "EUROSIM events" which include congresses, conferences, symposia, workshops etc. For institutional members counts that they can join national "DBSS events" with three persons against the reduced fee.

Those interested to become a member of DBSS are invited to write to the secretary:

Dutch Benelux Simulation Society
Mrs. Marja Dekker-Genemans
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Email L.Dekker@pa.twi.tudelft.nl

(Please mention your name, affiliation and address (including email, fax and telephone number), and indicate whether you are interested in the personal or institutional membership).

The Steering Committee exists of the following members:

A.W. Heemink (TU Delft): Chairman
L. Dekker: Vice-Chairman
M.J. Dekker-Genemans: Secretary
W. Smit (AKZO NOBEL): Treasurer
Th.L. van Stijn
(Ministry of Public Works/RIKZ): Member

Coming Events

EUROSIM 2001

EUROSIM 2001 - SHAPING FUTURE WITH SIMULATION, the 4th International EUROSIM Congress, in which is incorporated the 2nd Conference on Modelling and Simulation in Biology, Medicine and Biomedical Engineering

June 26 - 29, 2001 in Delft, The Netherlands.

Please visit our website where you can find all latest news:
http://ta.twi.tudelft.nl/PA/Eurosim2001/index.html
Deadline Early registration is May 1st, 2001. You can find the registration form on the Congress site, including the partners/excursions programme. The preliminary programme will become available after April 1, 2001.

For information by regular mail, electronic mail or fax, please contact:

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Faculty of Information Technology and Systems
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If you need information by phone please contact:

Marja Dekker, tel: +31 10 5112714 or
Arnold Heemink, tel: +31 15 2785813

Annual general DBSS meeting

The meeting will take place in Delft, during the Congress. The DBSS members will be informed by separate mail, as soon as the exact date is fixed.

Marja Dekker-Genemans

FRANCOSIM

FRANCOSIM was created in 1991 and aims to the promotion of simulation and research, in industry and academic fields. It has members from large French companies and members of Belgian and French universities. Francosim operates two poles, Modelling & simulation of continuous systems, and Modelling & simulation of discrete events systems

Modelling & simulation of discrete events systems

A large community of researchers interested in discrete event simulation exists in France. application areas are varied and include: hospitals, harbours, transportation systems, computers and industrial systems. Manufacturing systems are probably the main area of interest of FRANCOSIM members from the discrete side.

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Modelling & simulation of continuous systems

The pole is presently reorienting its work towards the organisation of one day workshops on specific subjects. It had organised in April 1999 BioMedSim'99, a conference on modelling and simulation in medicine and biology. This conference has led to the selection of several papers to appear in a special issue of Simpra. This pole will organise in 2001 the 2nd BioMedSim'01 in parallel with EuroSim congress.

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No news received, summary from SNE29/30

HSS

General Information

The Hungarian Member Society of EUROSIM was established in 1981 as an association promoting the exchange of information within the community of people involved in research, development, application and education of simulation in Hungary and also contributing to the enhancement of exchanging information between the Hungarian simulation community and the simulation communities abroad. HSS deals with the organization of lectures, exhibitions, demonstrations, round table discussions and conferences.

Activities

At the Simulation Laboratory of the Department of Information Management on the Faculty of Economic and Social Sciences of the Budapest University of Technology and Economics lecture series on simulation methodology and applications is held on a regular basis for students, academics and external experts of various fields. In these lectures different simulation tools and fields of applications are dealt with. At the Szechenyi Istvan University of Applied Sciences the discipline of simulation is also taught. These contribute to the dissemination of the knowledge for the young generation. In these activities members of society take an active part.

We are co-operating in the organization of several international simulation conferences as 23rd International Conference on Information Technology Interfaces, Pula, Croatia and EUROSIM 2001 – the 4th International EUROSIM Congress, where HSS is one of the co-sponsors.

Efforts are being made to increase the simulation activities in institutions located beyond the capital and include teaching staff and students as well as industry. The leadership and members of the society are also active in R&D activities and international projects within the framework of the International McLeod Insti-

tute of Simulation Sciences at the Hungarian Center (located of Budapest University of Technology and Economics) and the Hungarian Satellite Center (located in the Szechenyi Istvan University of Applied Sciences in Gyor).

Contact Address

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Email: javor@eik.bme.hu

A. Jávor

ISCS

Italian Society for Computer Simulation

General Information

The Italian Society for Computer Simulation (ISCS) is a scientific non-profit association of members from industry, university, education and several public and research institutions with common interest in all fields of computer simulation. Its primary purpose is to facilitate communication among those engaged in all aspects of simulation for scientific, technical or educational purposes.

The affairs of the ISCS are directed by a Steering Committee presently consisting of the following persons:

Giuseppe Iazeolla (chairman)
Mario Savastano (vice-chairman)
Vincenzo Grassi (treasurer)
Vittorio Cortellessa (secretary)
Pasquale Daponte (committee member)
Franco Maceri (retiring chairman)

Membership

At present ISCS counts 129 members: 13 institutional, 4 honorary, 110 regular and 2 affiliate. Charges per annum are Lit. 30,000 for regular and affiliated members and Lit. 400,000 for institutional members.

Contact addresses

For further information or application for membership, please contact:

ISCS - c/o Dipartimento Ingegneria Informatica
Università di Roma "Tor Vergata"
Via di Tor Vergata, Roma, Italy 00133
Phone: +39 6 7259.7380 -.7381
Fax: +39 6 7259.7460
E-mail: {grassi,cortelle}@info.utovrm.it
http://remlab.dis.unina.it/iscs/iscs_hp.htm

Activities

On December 15th, 2000 the annual conference of ISCS was held in Lecce. The conference involved a plenary session with 24 contributed talks selected by the Scientific Committee composed of: G. Iazeolla, University of Rome "Tor Vergata" (Chairman); F. Maceri, University of Rome "Tor Vergata"; A. Anglani, University of Lecce; F. Cennamo, University of Naples; L. Donatiello, University of Bologna; P. Daponte, University of Sannio; V. Grassi, University of Rome "Tor Vergata"; A. Leonardi, University of Rome "Tor Vergata"; M. Colajanni, University of Modena and Reggio Emilia; R. Vaccaro, University of Naples; V. Cortellessa, University of Rome "Tor Vergata"; A. D'Ambrogio, University of Rome "Tor Vergata"; R. Mirandola, University of Rome "Tor Vergata"; M. Savastano, National Research Council, Naples.

The contributions covered several topics, including methodology, tools and applications.

Notices and Events

The annual meeting of ISCS members will be held in Rome in few weeks for the new Steering Committee election.

We recall that an electronic mailing list has been constituted for persons interested in the ISCS activities. In order to be included in such list, it suffices to send an E-mail message (Subject: ISCS mailing list) containing name, affiliation and address (surface and electronic) to the following address:

cortelle@info.uniroma2.it.

To spread information to italian simulation community, you are invited to send E-mail messages to cortelle@info.uniroma2.it and they will be forwarded to all the addresses of the mailing list.

Vittorio Cortellessa
vittorio@csee.wvu.edu

PSCS

General Information

PSCS (The Polish Society for Computer Simulation) was founded in 1993 in Warsaw. PSCS is a scientific, non-profit association of members from universities, research institutes and industry in Poland with common interests in variety of methods of computer simulations and its applications.

At present PSCS counts 209 members. The Board of third cadence consisting of the following persons directs the affairs of the PSCS:

- Andrzej Tylikowski - President
- Leon Bobrowski - Vice President
- Andrzej Chudzikiewicz - V-ce President
- Zenon Sosnowski - Secretary
- Kazimierz Furmanik- Treasurer
- Roman Bogacz
- Jaroslaw Rybicki
- Zygmunt Strzyzakowski

Activity

The main activity of the Polish Society for Computer Simulation are annual conferences known as "PSCS Workshops on Simulation in Research and Development". The PSCS Workshops were organized in: Mielno (1994), Warszawa (1995), Wigry (1996), Jelenia Gora (1997, 1998), Bialystok (1999).

Past Events

The annual PSCS Workshop on Simulation in Research and Development took place on September 14-16, 2000 in Zakopane-Koscielisko, Poland.

The 35 papers of the workshop covered the following areas: simulation in mechanical engineering, simulation in mathematical problems, artificial intelligence and simulation, simulation in transportation, neural nets and simulation, simulation in automation and control, military simulation, simulation tools.

Publications

Proceedings of the 6th PSCS Workshop on "Simulation in Research and Development", L. Bobrowski and R.Bogacz (Eds.), Warsaw, 2000, (in Polish). The price is 20,- PLN.

Coming Events

Dr. J. Rybicki will organize the 8th PSCS Workshop on "Simulation in Research and Development" on August 30 - September 1, 2001 in Gdansk-Sobieszewo, Poland.

ryba@task.gda.pl
http://www.task.gda.pl/ptsk-2001/

Contact Address

Prof. Andrzej Tylikowski
The Polish Society for Computer Simulation
c/o WSiMR Politechniki Warszawskiej
ul. Narbutta 84, 02-524 Warszawa, Poland
tel. (+48 22) 6608244, fax. (+48 22) 6608622
e-mail: Andrzej.Tylikowski@simr.pw.edu.pl

Z. Sosnowski

ROMSIM

Romanian Simulation Society

ROMSIM - ROmanian Society for Modelling and SIMulation, has been founded in 1990 as a non-profit society devoted to both theoretical and applied aspects of computer modelling and simulation of systems. In April 1999 ROMSIM has been accepted as observer society in EUROSIM.

Contact Address

Florin Stanciulescu
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Averescu Avenue 8-10
RO-71316 Bucharest, Romania
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No news received, summary from SNE29/30.

SIMS

Scandinavian Simulation Society

SIMS is the Scandinavian Simulation Society with members from the four Nordic countries Denmark, Finland, Norway and Sweden. The SIMS history goes back to 1959. SIMS practical matters are taken care of by the SIMS board consisting of two representatives from each Nordic country.

The SIMS annual meeting takes place at the annual SIMS conference or in connection to international simulation conferences arranged in the Nordic countries.

The SIMS Board

Peter Fritzson, chairman
Bernt Lie, vice chairman
Arne Jakobsen, secretary
Kaj Juslin, treasurer
Björn Bergström
Esko Juuso, Falko Wagner, Anne Elster

Contact Information

Updated SIMS web page with news and recent information:

http://browse.to/sims or
http://www.ida.liu.se/~pelab/sims

You can contact the chair of the SIMS board, Prof. Peter Fritzson (Linköping University, Sweden),

Peter Fritzson, IDA, Linköping University,
58183, Linköping, Sweden.
Tel: + 46 13 281484 Fax: +46 13 284499
Email: petfr@ida.liu.se

To become a member of SIMS you should join one of the SIMS member organizations, as specified on the SIMS web page, e.g. MoSis, the Society for Modelling and Simulation in Sweden, or FSF, the Finnish Simulation Forum.

Coming Events

SIMS 2001 Oct. 8-9, 2001

42nd Scandinavian Conference on Simulation and Modeling, will take place in Porsgrunn, Norway, October 8-9, 2001.

Porsgrunn is located on the coast 150 km southwest of Oslo, and 190 km northeast of Kristiansand (on the southern tip of Norway). The conference venue will be Telemark University College (Høgskolen i Telemark, HiT), Faculty of Technology.

The aim of this conference is to cover broad aspects of modeling and simulation and scientific computation. It will thus be of interest for model builders, simulator personnel, scientists, engineers, vendors, etc. The scientific program will consist of technical sessions with submitted and invited papers, and is open for poster sessions and vendor demonstrations. Presented papers will be considered for publication in the Journal "Modeling, Identification and Control".

Conference themes include, but are not limited to, the following topics:

- Modeling Tools
- Simulation Tools and Technology
- Training Simulators Real-Time Simulation
- Process Plant Simulation
- Simulation in Power Station Design
- Simulation in Power Electronics
- Simulation of Electronic Systems
- Simulation of Marine Systems
- Simulation of Energy Systems
- Simulation in Control Engineering
- Simulation in Chemical Engineering
- Simulation in Mechanical Engineering
- Visualization in Modeling and Simulation
- Numerical methods for simulation
- Parallel simulation

A centrally located area will be available for demonstrations and exhibitions during the conference. Vendor demonstrations of commercial simulation systems are particularly welcome as poster presentations. For demonstrations, video sessions, workshops exhibitions or sponsorships, please contact the organizing committee.

Authors should submit an extended abstract of approximately 1-2 pages A4 to the address below before May 15th, 2001. Abstracts will be reviewed by members of the Scientific Committee, and notification of acceptance or rejection will be sent out by June 15th, 2001. Final version of accepted "camera-ready" papers are due by September 1st, 2001. A preliminary conference program will be available June 30th, 2001

Further information:

SIMS 2001 c/o Bernt Lie
Department of Process Control,
Telemark University College
Box 203, 3901 Porsgrunn, Norway.
Fax: (+47) 35 57 52 50, Ph: (+47) 35 57 50 00
E-mail: Bernt.Lie@hit.no
Web:http://www-pors.hit.no/tf/sims2001/sims.htm

Finnish Simulation Forum (FinSim)

The Finnish Simulation Forum (FinSim) is a new section of the Finnish Society of Automation. FSF is a member organisation of the Scandinavian Simulation Society (SIMS), and all the members of FSF are also individual members of SIMS.

The Finnish Society of Automation (FSA), founded in 1953, is a professional association for specialists within the field of automation technology. The FSA operations cover all branches of the industry. The members represent various fields of automation, including trade, research, manufacturing, education, design and use. The Aim of the Society is to promote control theory, technological development and industrial applications, be a forum for members and all users of automation to disseminate technological experience and to advance professional skills, enhance exchange of information between domestic and international organizations. More information is available from

http://www.automaatioseura.fi/indexen.html

FinSim acts as a discussion forum for simulationists on various research and application areas. The purpose is attained by

- increasing the members knowledge about M&S,
- promoting technology transfer of simulation applications between different industry and research areas,
- collecting and disseminating M&S-related information,
- co-operating with national and international organisations.

FinSim's activities include lectures, visits, seminars, information distribution, and participation in M&S projects. Additional information about the Finnish Simulation Forum (FinSim) is available from
http://www.automaatioseura.fi/

You can also contact the chair of the FinSim board. To become a member of FinSim contact Finnish Society of Automation (office@atu.fi).

Further information

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Email: esko.juuso@oulu.fi

Esko Juuso

SLOSIM

Slovenian Society for Modelling and Simulation

General information

SLOSIM was established in 1994 and become the full member of Eurosim in 1996. It has 85 members from both Slovenian universities, institutes and industry as well and aims the promotion of modelling and simulation in industrial and academic environments and to facilitate communication among corresponding groups.

Contact Address

Borut Zupancic, president of SLOSIM
Faculty of Electrical Engineering
Trzaska 25, SLO - 1000 Ljubljana, SLOVENIA
Tel: +386 1 4768 306, Fax: +386 1 4264 631
Email: borut.zupancic@fe.uni-lj.si
slosim@fe.uni-lj.si

Recent Avtivities

Cooperation in organization of the traditional ELECTROTECHNICAL AND COMPUTER CONFERENCE ERK'2000 in September in Portorož, where SLOSIM organized two simulation sessions.

Annual assembly meeting in November 27, 2000 took place at the Jožef Stefan Institute. After that there was a group presentation: Department of Automatics, Biocybernetics and Robotics. (see presentation of simulation centres).

SLOSIM WEB page was significantly improved:
http://msc.fe.uni-lj.si/SLOSIM/

Introduction of *Institute Jož ef Stefan, Department of Automatics, Biocybernetics and Robotics Cooperation* in SNE corner *Simulation Centres.*

Borut Zupancic
zupancic@fe.uni-lj.si

UKSIM

United Kingdom Simulation Society

General Information

The UK Simulation Society has about 80 members throughout the UK from both universities and industry. It is active in all areas of simulation and holds a biennial conference as well as regular smaller meetings and seminars.

Conferences

In March UKSim 2001, the Fifth United Kingdom Simulation Society Conference took place in the Emmanuel College, Cambridge, England. 28th-30th March 2001. A report may be found in the next issue of SNE.

Although a national event, presenters and participants from various other countries were also welcome, especially EUROSIM member countries.

Membership

Membership of the UK Simulation Society is very good value at only £20 per year including a subscription to Simulation News Europe. For more information, contact the Membership Secretary,

Dr. Richard Cant,
UKSim Membership Secretary
Dept of Computing,
The Nottingham Trent University,
Nottingham,
NG1 4BU.

Gary G. Gray
gary@dcs.gla.ac.uk

AES

Spanish Simulation Society

Contact Address

J.M. Giron-Sierra AES,
Asociación Espanola de Simulación Avda.
San Luis 146, E-28033 Madrid, Spain
Tel: +34-1 394 43 87, Fax: +34-1-394 46 87
email: gironsi@dia.ucm.es

No news received, information from SNE29/30

SCS

SCS Structure

SCS is the international multidisciplinary forum dedicated to reseach, development, application and education in modeling and simulation. Since its founding in 1952 as Society for Computer Simulation, the world changes and topics related to simulation become more complex and methodology oriented. Due to that the Society decide during the annual Board of Directors Meeting at the Summer Computer Simulation Conference 2000, held at Vancouver, to change its name to Society for Computer Modeling and Simulation. The Society operates since 1952 a headquarter in San Diego, California, USA., and since 1985 an European SCS Office in Ghent, Belgium. The later was changed in 1994 into SCS Europe BVBA, which now is the organisational and financial organisation behind the SCS European Council, which was established in 1991.

SCS Europe BVBA runs the SCS European Publishing House, which cooperates very close with ASIM, the German speaking Simulation Society, with members from Austria, Germany and Switzerland. Moreover SCS Europe BVBA organises international recommended scientific conferences on computer modeling and simulation and related fields. The flagships of which are the "European Simulation Multiconference" (ESM) and the "European Simulation Symposium" (ESS), and several smaller conferences on specific topics. ESM and ESS are very well accepted by conference participants, shown by the figures of about 180 to 250 participants.

In 2000 SCS Europe BVBA and ASIM agreed, due to the successful cooperation in the common publication activities, to start a closer cooperation in international conferences. The first ESS/ASIM Joint Conference was the ESS 2000, held in Hamburg. The second will be the ESM 2001 in Prague, where ASIM Members will take over track chairs and organise sessions.

SCS European Council

AS mentioned in SNE, issue 29/30 2000, a new chair of the SCS European Council is on duty. The new council has implemented an ExCom of the council board with the responsibilities:

- *European Council Board Chair: D. P.F. Möller*
- *European Conference Board – ESM Series: Andre Bargiela, ESS Series: Alexander Verbraeck*
- *Publishing: Rainer Rimane*
- *Industry: Wilfried Krug*
- *SCS Europe Bvba: Philippe Gerill*

SCS ESM and ESS Events

ESM 2001

The ESM 2001, the 15th conference in its series of the SCS flagship ESM, will be held from June 5 – 9, 2001, in the beautiful city of Prague which offers visitors a breathtaking historical environment in which the participants will enjoy the ESM 2001. The conference site will be at the Masarykova Kolej, Th-kurova 1, which is part of the CTU Prague, and which boasts an academic restaurant, congress halls and meeting rooms.

The ESM 2001 Conference Tracks covers:

- *Methodology and Tools, Simulation in Engineering*
- *Parallel and Distributed Simulation*
- *Verification, Validation and Accreditation*
- *Military Simulation, Real-Time Simulation and Simulators, Advanced Techniques*
- *Neural Nets and Simulation, Data Mining*
- *High Performance Computing*
- *Analytical and Stochastic Modelling Techniques*
- *Simulation in Transport and Logistics*
- *Simulation in Biology and Medicine*

Deadlines: Paper submission April 30, Conference June 6 – 9. Conference Prices for SCS/ASIM/ EUROSIM Members 450 Euro, All other 500 EURO (price include Proceedings, lunches, conference dinner, get-together party and coffee breaks)

ESS 2001

The ESS 2001, the 13th conference in its series of the SCS flagship ESS, will be held from October 18 – 20, 2001 in the beautiful city of Marseilles which offers visitors a breathtaking historical environment in which the participants will enjoy the ESS 2001.

The ESS 2001 Conference Tracks covers:

Methodologies:

- *Artificial Intelligence, Distributed Interactive Simulation, High Performance Computing, Languages*
- *Modelling Techniques, Simulation Methodologies & Tools, Synthetic Environment, Virtual Reality*
- *Petri nets, DEVS, Bond Graph*

Applications:

- *Automation, Biotechnology, Medical Sciences*
- *CAD/CAM/CAE, Defense, Design Automation*
- *Business, Emergency Management*
- *Environmental Sciences, Industrial Engineering*
- *Industrial and Process Simulation*
- *Intelligence & Secrurity, Logistics, Manufacturing*
- *Mission Earth, Services, Power Plants*
- *Telecommunications, Training & Educational Support, Transport Systems*

Deadlines:

- *Abstract submission date March 30*
- ***Notification** June 15*
- ***Paper submission** September 10*
- ***Conference** October 18 - 20*

Conference Prices for SCS/ASIM/EUROISIM Members 475 Euro, All other 525 EURO (price include Proceedings, lunches, conference dinner, get-together party and coffee breaks)

Other SCS Europe Events

MESM 2001

The 3rd Middle Eastern Symposium will be held in Amman, Jordan, from September 3-5, 2001 and is the third conference after the succesful start of the first MESM'99 held in Jordan. One of the major aims of this conference is to bring people from various parts of the Middle East in contact with colleagues working in modelling and simulation from around the world. The other aim is to establish a local chapter in the Middle East. This conference is sponsored by De Montfort University (UK), as well as by IEEE-UKRI-SPC.

For further information you can contact: Prof. Dr M. Al-Akaidi, General Conference & Programme Chair. De Montfort Univerity, Leicester, UK., Email: mma@dmu.ac.uk

The MESM'2001 Conference Tracks cover:

- *Modelling and Simulation Methodology*
- *Simulation of Networks and Communication Systems Simulation, Simulation of Signal and Image Processing, Energy System Simulation*
- *Multimedia Decision Processing in Management*
- *Modelling and Simulation for Biomedical Applications, Modelling and Simulation for Industrial Applications*
- *Web-based Simulation, Software Engineering*
- *Simulation in Information Processing*
- *Simulation in Fuzzy Systems, Neural Networks and Genetic Algorithms*
- Simulation in Archeology,
- Simulation in the Arab World

GAME-ON 2001

The 2nd Game-On Conference will be held in London, November, 2001. More precise details will be available in the coming weeks about the exact dates.

The aim of this conference is to bring together researchers and games people in order to exchange ideas on programming and programming techniques, which will be beneficial to the gaming industry and academia. Secondly it aims to steer young people into this industry by providing how-to tutorials and giving them the opportunity to show their ideas and demos to the gaming industry.

The conference will concentrate mostly on the programming of games, with special emphasis on simulation, AI and fuzzy sets, and physics related computer graphics. Next to that, all of this will be fused in the topic of computer game design in stand-alone and networked games

2001 European Simulation Interoperability Workshop

This workshop which, is organized by SISO, SCS Europe Bvba and ITEC Ltd, and which, is held at the University of Westminster, London, United Kingdom June 25-27, will include multiple tracks and special sessions addressing simulation interoperability issues and proposed solutions, tutorials on state-of-the-art methodologies, tools and techniques, and exhibits displaying the latest technological advances.

The workshop enable modeling and simulation user and technical communities - especially those in Europe - to share ideas and experiences, to dientify ways to make distributed simulation more effective and efficient, to support the development of appropriate interoperability standars and to share insights and experiences related to the High-Level Architecture. (HLA).

More information about this conference can be found on the SISO website:

http://www.sisostds.org/siw/01Euro/index.htm

If you plan to attend any of the conference mentioned above please contact for more information:

Philippe Geril, SCS Europe BVBA
University of Ghent, Coupure Links 653
B-9000 Ghent, Belgium
Phone: +32.9.233.77.90, Fax: +32.9.223.49.41
Tel/Fax Priv:+32.59.800.804
E-Mail : philippe.Geril@rug.ac.be
URL: http://www.scs-europe.org

Contact

If you have any question about the SCS European Council don´t hesitate to contact us:

D. P. F. Möller, Chairman SCS European Council
dietmar.moeller@informatik.uni-hamburg.de

E-Mail SCS Europe: philippe.Geril@rug.ac.be
E-Mail SCS EuropeanPublishing House:
rainer.rimane@informatik.uni-erlangen.de
***weblink :** http;/www.scs-europe.org*

Conference Announcements

AGENT BASED SIMULATION II

The 2nd Annual SCS Agent Based Simulation Conference was held from April 2 – 4, 2001, at the Department of Mathematics and Informatics, University of Passau, Germany. Report see next issue.

ECEC

The ECEC 2001, the 8th annual conference in its series, will be held from April 18 – 20, 2001, at the Universidad Politechnica de Valencia, in the beautiful city of Valencia, Spain. Valencia is located at the mid point of the Spanish east Mediterranean coast, 350 east of Madrid and 350 km south of Barcelona. It is a cosmopolitan city, its openness making it the meeting point of various civilizations ove the years.

The ECEC 2001 Conference Topics covers:

- *Business in CE, Organization and Management*
- *Implementation Techniques, Formal Methods and Techniques, Process Modeling*
- *Engineering Data Management and Information Modeling*
- *Engineering Process Management*
- *Collaborative CE Environments for Virtual Teams*
- *Networking and distribution in CE*
- *Practical Applications and Experiences*

Deadlines: Paper submission March 10, Conference April 18 - 20. Conference Prices for SCS/ASIM/ EUROSIM Members 475 Euro, All other 525 EURO (price include Proceedings, lunches, conference dinner, get-together party and coffee breaks)

EUROMEDIA

The EUROMEDIA 2001, the 6th annual conference in its series, will be held from April 18 – 20, 2001, at the Universidad Politechnica de Valencia, in the beautiful city of Valencia, Spain. Valencia is located at the mid point of the Spanish east Mediterranean coast, 350 east of Madrid and 350 km south of Barcelona. It is a cosmopolitan city, its openness making it the meeting point of various civilizations ove the years.

The EUROMEDIA 2001 Conference brings together four individual conferences:

WEBTEC -MEDIATEC- COMTEC- APTEC

Deadlines: Paper submission March 10, Conference April 18 - 20. Conference Prices for SCS/ASIM/ EUROSIM Members 475 Euro, All other 525 EURO (price include Proceedings, lunches, conference dinner, get-together party and coffee breaks)

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in which is incorporated the
2nd Conference on Modelling and Simulation in Biology,
Medicine and Biomedical Engineering

June 26-29, 2001,
Delft, The Netherlands

http://ta.twi.tudelft.nl/PA/Eurosim2001/index.html

If you plan to attend please contact

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B-9000 Ghent, Belgium
Phone: +32.9.233.77.90, Fax+32.9.223.49.41
E-Mail : philippe.Geril@rug.ac.be
http;//www.scs-europe.org

MISS - SCS McLeod Institutes of Simulation Sciences

The McLeod Institutes of Simulation Sciences of SCS are a network of semi-independent centers dedicated to advancing the art and science of modeling and simulation in science, engineering, and related fields of interest. The idea of MISS was first introduced by the MISS Founder Prof. Dr. emeritus Ralph Huntsinger, California State University, Chico. The institute is named to honor John McLeod, the founder of SCS, and the first editor of the journal simulation. The MISS centers allow persons interested in modelling and simulation to gather together in the MISS network to form up specific expertises to work in a common interest professional area.

Some advantages of this network of centers are as follows:

- encourage and coordinate research in computer modelling and simulation
- enhance opportunities for undergraduate and graduate research, education, and training
- stimulate the development, use and evaluation of new international techniques and materials which make use of modelling and simulation

MISS activities include

- engaging in basic and applied research by faculty, students, and associates concentrated in the areas of design, implementation, application, and evaluation of computer modeling and simulation tools and techniques
- establishing and maintaining liaison with researchers elsewhere, especially in the MISS network, with SCS and other appropriate professional, industrial, and student organizations
- preparing and presenting workshops, seminars, symposia, on modelling and simulation and aimed at diverse audiences including researchers in academia and industry, teachers, students, and others
- encouraging and facilitating cross-disciplinary research in computer modelling and simulation
- encouraging and facilitating the use of modelling and simulation techniques and materials in courses throughout the University and elsewhere

SCS European MISS Centers

There are 12 MISS centers in Europe working in the fields of modelling an simulation research, application and education. Three European MISS Centers and three US MISS Centers received a three-year Fund for the improvement off Postsecondary Education, financed by the European Commission in Bruxels and the US Government in Washington, for the development of a graduate degree programme in computer modelling and simulation.

Universities who are interested joining SCS becoming a MISS center may contact

SCS MISS International Director Dietmar P. F. Möller
University of Hamburg
Vogt-Kölln-Str. 30, D-22527 Hamburg
phone: +49-40-42883-2438, fax: +49-40-42883-2552
email:dietmar.moeller@informatik.uni-hamburg.de
http://www.informatik.uni-hamburg.de/TIS/

MISS - PhD - Initiative

In February 2001 Professor Felix Breitenecker director of the International McLeod Institute of Simulation Sciences Satellite Center at the Technical University of Vienna visited the Hungarian Satellite Center at the Szechenyi Istvan University of Applied Sciences in Gyor to prepare the cooperation between the national centers and the respective universities.

At the discussions from the Hungarian side Professor Peter Keresztes rector of the Szechenyi Istvan University of Applied Sciences and director of the Satellite Center located there and Professor Andras Javor dean of the Faculty of Informatics and Electrical Engineering and director of the Hungarian Center at the Budapest University of Technology and Economics and co-director of the whole network have participated.

During the discussions it was agreed that a cooperation between the universities and the respective centers will be started to undertake Ph.D. programs in simulation sciences as a joint venture. The studies and research work will be divided between the respective institutions and the diploma will be issued by the Technical University of Vienna. Simultaneously the students will obtain a document stating that the degree is issued also by the International McLeod Institute of Simulation Sciences. This will be the first concrete realization of the international degree in simulation sciences within the framework of the International McLeod Institute of Simulation Sciences

Andras Javor
javor@eik.bme.hu

SIMULATION SOCIETIES

JSST

Japan Society for Simulation Technology

JSST, The Japan Society for Simulation Technology , was established under its present name in 1981.

The JSST is the registered society, recognized by the Science Council of Japan. There are about 700 active members including the corporate and student members. The members of the Society come from both industry and academia, who are not only simulation engineers and scientists for system analysis and modeling, simulation language, process simulation, traffic and environmental simulation, but also those for the numerical or computational simulation.

The JSST provides a forum for the exchange and the dissemination of the information of the widespread topics of simulation technology from hard ware to soft ware, which includes the following activities:

Information

Prof. Dr. S. Takaba (takaba@cc.teu.ac.jp)
c/o JSST Office, Tokyo
Ms. N.Sawada (simul@pp.iij4u.or.jp)
Tel : +81 (3) 3239-4738
Fax : +81 (3) 3239-4714
URL: http://wwwsoc.nacsis.ac.jp/jsst/

LSS

On September 8-9, 2000 the Latvian Simulation Society was organising, in co-operation with the Riga Technical University, Linköping University, BALTECH University Consortium in Science and Technology, and Baltic Operations Research Society, the Second International Conference “Simulation, Gaming, Training and Business Process Reengineering in Operations”.

Prof. Yuri Merkuryev
Riga Technical University
1, Kalku Street
LV-1658 Riga, Latvia
Tel: +371-7089514
Fax: +371-7089513
E-mail: merkur@itl.rtu.lv

For information about LSS please contact Y. Merkuryev

Y.Merkuryev

YSS

General information

Yugoslav Simulation Society (YSS) was founded in 1998. Main goals of YSS are to gather researchers developing or using simulation tools from any research and development area, to help them express their views, to help them access to other’s research results and to try to establish international collaboration of Yugoslav and other simulation societies including the European federation of simulation societies.

News

The YSS was established at the end of 1998, but its real activity was postponed for one year because of unpleasant events which took place in the period from March 24th to June 10th 1999 in Yugoslavia.

Events

Our first serious activity was the realization of the Small System Simulation Symposium - SSSS2000, September 04-05, Faculty of Electronic Engineering,

http://yss.elfak.ni.ac.yu/ssss2000/ which was organized with the Faculty of Electronic Engineering at University of Nis, Yugoslavia. The activities within the symposium where organized in four events: three sessions and a Round Table in the following order:

1. Simulation of microelectronic and microelectromechanical systems
2. Advanced modeling of small systems
3. Simulation and realization of small systems
4. Round Table: Simulation of small systems and the role of SSSS.

Scientists from five West European countries and from Yugoslavia participated to the Symposium. We think that the SSSS2000 was a full success. A confirmation of this statement comes by Elesevier who will publish all (11) papers as a special issue of its “Microelectronics Journal” devoted to SSSS2000.

Contact Address

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WWW: http://yss.elfak.ni.ac.yu/

Vanco Litovski

INTERNATIONAL SOCIETIES & USER GROUPS

System Dynamics Society

What is System Dynamics

System dynamics is a methodology for studying and managing complex feedback systems, such as one finds in business and other social systems. In fact it has been used to address practically every sort of feedback system. While the word system has been applied to all sorts of situations, feedback is the differentiating descriptor here. Feedback refers to the situation of X affecting Y and Y in turn affecting X perhaps through a chain of causes and effects. One cannot study the link between X and Y and, independently, the link between Y and X and predict how the system will behave. Only the study of the whole system as a feedback system will lead to correct results

The methodology System Dynamics

- *identifies a problem,*
- *develops a dynamic hypothesis explaining the cause of the problem,*
- *builds a computer simulation model of the system at the root of the problem,*
- *tests the model to be certain that it reproduces the behavior seen in the real world,*
- *devises and tests in the model alternative policies that alleviate the problem, and*
- *implements this solution.*

Rarely, is one able to proceed through these steps without reviewing and refining an earlier step. For instance, the first problem identified may only be a symptom of a still greater problem.

The field developed initially from the work of Jay W. Forrester. His seminal book *Industrial Dynamics* (Forrester 1961) is still a significant statement of philosophy and methodology in the field.

Since its publication, the span of applications has grown extensively and now encompasses work in

- corporate planning and policy design
- public management and policy
- biological and medical modeling
- energy and the environment
- theory development in the natural and social sciences
- dynamic decision making
- complex nonlinear dynamics

Relationship to System Dynamics

Systems thinking looks at exactly the same kind of systems from the same perspective. It constructs the same causal loop diagrams. But it rarely takes the additional steps of constructing and testing a computer simulation model, and testing alternative policies in the model.

Aims of the System Dynamics Society

The *System Dynamics Society* is an international, nonprofit organization devoted to encouraging the development and use of systems thinking and system dynamics around the world. With members in fifty-five countries, the Society provides a forum in which researchers, educators, consultants, and practitioners in the corporate and public sectors interact to introduce newcomers to the field, keep abreast of current developments, and build on each other's work.

System Dynamics Review

The Society's journal is published quarterly by John Wiley & Sons, under the editorship of Graham Winch of the University of Plymouth and an international editorial board. The *Review* publishes high quality, peer-reviewed advances in systems thinking and system dynamics and their applications to societal, technical, managerial, and environmental problems.

The *Review* is available online through Wiley InterScience to society members.

The *Review* is abstracted in Cambridge Scientific Abstracts, CC/Social & Behavioral Sciences, Computing Reviews, Geobase, Geographical Abstracts: Human Geography, Research Alert (ISI), and the Social Sciences Citation Index (ISI).

International System Dynamics Conferences

The Society's annual international conference is held alternately in North America and Europe, with occasional appearances in Asia and the Pacific rim (2000 Bergen, Norway; 2001 Atlanta, USA). These conferences, and the meetings of local chapters and interest groups, introduce newcomers to the field, keep practitioners aware of current developments, and provide unparalleled networking opportunities.

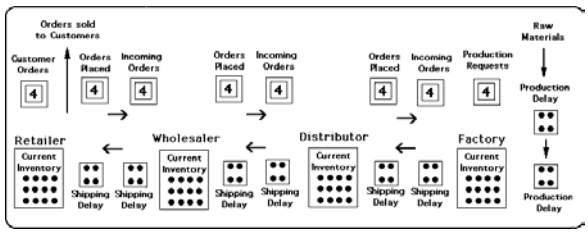
Printed proceedings for most previous conferences can be ordered from the Society. Current and future conferences will make use of the world wide web to disseminate conference information and papers.

The 2001 Conference will be in Atlanta, Georgia, USA:
http://www.albany.edu/cpr/sds/2001 Conference.htm

Production Distribution Game - *"The Beer Game"*

The Beer Game was developed to introduce students, managers and executives to concepts of system dynamics. The purpose of the game is to illustrate the key principle that "structure produces behavior." Players experience the pressures of playing a role in a complex system and can see long range effects during the course of the game. Each player participates as a member of a team that must meet its customers' demands. The object of the game is to minimize the total cost for your team.

In the structured debriefing that follows it, the game illustrates a number of insights about management systems that generalize well beyond inventories. To play the game and debrief the game takes a minimum of just over two hours. The debriefing is the most important part of the game. Each game board accommodates up to 8 players (4 pairs of 2) comfortably. Additional boards may be purchased for a larger group. If assistance is needed in facilitating the playing of the "Beer Game," we can let you know of skilled facilitators in your area.



One complete educational "Beer Game" consists of the large vinyl game board, printed instructions, the customer order deck, order slips, pencils, 600 plastic game chips, and a video showing the game being played at MIT (cost is US$125, plus shipping).

For more information on the "Beer Game" and instructions, please visit the Internet site:

http://www.sol-ne.org/pra/tool/beer.html

Contact, Information

For information, the beer game, bibliography of System Dynamics, or older back issues of our journal please contact

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Winter Simulation Conference

Introduction. The Winter Simulation Conference (WSC) is the premier international forum for disseminating recent advances in the field of system simulation, with the principal focus being discrete-event simulation and combined discrete-continuous simulation. In addition to a technical program of unsurpassed scope and quality, WSC provides the central meeting place for simulation practitioners, researchers, and vendors drawn from all disciplines and from the industrial, governmental, and academic sectors.

Overview of the Conference. The Winter Simulation Conference features tracks devoted to leading-edge developments in analysis and modelling methodology as well as a diverse range of application areas, including: business process engineering; computer and communication systems; construction engineering and project management; education; healthcare; logistics, transportation, and distribution; manufacturing; military operations; and web-based simulation. Moreover, WSC offers an invaluable educational opportunity for novices and experts alike, with a large segment of each program devoted to introductory and advanced tutorials which are carefully designed to address the needs of simulation professionals at all levels of expertise and which are presented by prominent individuals in the field. Of particular interest to virtually all attendees are the software tutorials and the exhibits by software and hardware vendors which cover the full spectrum of commercial simulation products and services. Issued to each registrant at the beginning of the conference, the Proceedings of the Winter Simulation Conference contains complete documentation on the technical program.

Rounding out the attractions of WSC are meetings of several professional societies and users' groups along with social events which give attendees many opportunities to get acquainted and to become involved in the ongoing activities of the international simulation community.

WSC'01, Dec. 10 - 13
Arlington, Virginia, USA

The 2001 Winter Simulation Conference features a comprehensive program ranging from introductory tutorials to state-of-the-art research and practice. The conference includes student presentations, exhibits, training sessions by software/hardware vendors, business meetings for professional societies, user groups, a general reception, and a spouse's program.

Contributions

Contributions to the technical program are solicited in the following general areas, although papers in all areas of discrete-event and continuous simulation will be considered:

- ***Introductory Tutorials**: Educational presentations for newcomers to the field of simulation. Typical topics include fundamentals of simulation, validation and verification of simulation models, analysis of simulation experiments, introduction to simulation, and methods for selling simulation results.*
- ***Advanced Tutorials**: Educational presentations for attendees already familiar with the fundamentals of simulation, or comprehensive reviews that provide practitioners and researchers with an overview of recent advances in the field. Unconventional topics are particularly encouraged here.*
- ***Software Tutorials**: Expository presentations on simulation software and hardware systems, including simulation languages and environments for specification, development, documentation, management, animation, and presentation of simulation models.*
- ***Modeling Methodology**: Research presentations on the science of developing, managing, reusing and proving properties of simulation models. Typical examples include concepts and techniques for general systems modeling, model specification and development, support environments, animation, knowledge-based simulation, object-oriented simulation, parallel and distributed simulation, artificial intelligence, software engineering, and verification, validation, and testing.*
- ***Analysis Methodology**: Research presentations of the science of designing and analyzing simulation experiments. Typical examples include modeling and generating stochastic input processes, initialization techniques, experimental design, meta-modeling, output analysis, optimization, sensitivity analysis, ranking, selection and comparison procedures, and variance reduction techniques.*
- ***Manufacturing Applications**: Reports of new developments and sound practice in the use of simulation to solve manufacturing problems, including facilities planning, design of flexible or agile systems, design of cellular systems, material handling, just-in-time systems, production and inventory control, real-time control, computer integrated manufacturing, robotics, warehousing and distribution, supply chain management, and virtual manufacturing. In addition, a focused mini-track on Semiconductor Manufacturing is being organized.*
- ***Military Applications**: Reports of new developments and sound practice in the use of simulation to solve military problems, including battlefield simulation, applications in training, evaluation of strategies, and logistics problems.*
- ***Applications in Logistics, Transportation, and Distribution**: Reports of new developments and sound practice in the use of simulation to solve logistics and transportation problems including warehousing and distribution, supply chain management, passenger and cargo movements, on-the-road, rail, air, and water transportation.*
- ***Focused Mini-tracks**: Reports of new developments and sound practice in the use of simulation to solve problems in several domains. Focused mini-tracks are being organized for: Business Process Reengineering; Construction Engineering and Project Management; Web-Based Simulation; Semiconductor Manufacturing; Telecommunications; Simulation in Education; and Future of Simulation.*
- ***Poster Session**: Informal poster presentations on a variety of topic areas. Authors will have panels on which to place exhibit materials.*
- ***Ph.D. Student Colloquium**: The INFORMS College on Simulation invites Ph.D. students to present short research summaries on Sunday evening, December 9, 2001. Colloquium presenters are strongly encouraged to participate in the Poster Session.*

All submissions will be peer reviewed. Accepted papers will be published in the both the print volume and CD-ROM versions of the conference proceedings. Both will be copyrighted and widely disseminated.

Deadlines and Requirements

April 1, 2001: Electronically submit contributed papers not previously published or presented. The Submission Form and submission instructions are installed at the website. Each submission must be a 3 to 9 page paper, including an abstract.

April 1, 2001: Submit one to three page proposals to present introductory or advanced tutorials, to organize and chair regular paper sessions or to organize and chair panel sessions.

June 1, 2001: Contributors will be notified whether or not their paper has been accepted. An Author's Kit, including instructions for preparing manuscripts, will be available at the website

July 15, 2001: Authors provide a manuscript copy t to the Proceedings Editor. In addition, simultaneous electronic submission in one of the following formats: Microsoft Word, Corel WordPerfect, Tex or LaTex, will be required for the paper to be included on the CD-version of the Proceedings.

September 1, 2001: Poster Session and Ph.D. Student Colloquium submissions are due.

For any questions concerning the WSC '01 contact the program chair or visit WSC's website:

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INFORMS

The College on Simulation is a section of INFORMS, the Institute for Operations Research and the Management Sciences (http://www.informs.org/).

The College on Simulation is organized and operated exclusively for educational and scientific purposes:

i. to encourage the development and dissemination of knowledge in the area of simulation; and
ii. to promote communication and interaction among individuals and organisations who share an interest in simulation.

Distinguished Service Award (DSA)

Amongst other activities, INFORMS has established awards for outstanding simulationists.

To recognise individuals who have provided long-standing, exceptional service to the simulation community, the Institute for Operations Research and the Management Sciences (INFORMS) College on Simulation has established its Distinguished Service Award, which may be given to at most one person annually. Sustained service to the simulation community should extend over a period of 15 to 20 years or longer and be acquitted with distinction.

The winner of 2000 is Felix Breitenecker (report see elsewhere in this journal).

DSA - Call for Nominations 2001

To recognize individuals who have provided long-standing, exceptional service to the simulation community, the Institute for Operations Research and the Management Sciences (INFORMS) College on Simulation (http://www.informs-cs.org/) has established its Distinguished Service Award, which may be given to at most one person annually. Sustained service to the simulation community should extend over a period of 15 to 20 years or longer and be acquitted with distinction. The concept of service for this award does NOT include teaching or research contributions. Areas of volunteer service include, but are not limited to,

elected offices in simulation societies;

- editorial responsibilities for simulation such as department editor, area editor, and editor-in-chief;
- conference responsibilities involving simulation such as program chair, proceedings editor, general chair, and being a member of the organizing or program committee;
- appointed positions for simulation-related activities such as serving on committees and being a newsletter editor; and
- undertakings and actions that promote simulation in the "larger community."

Nominations for the Distinguished Service Award can be made by anyone and are made by sending a letter of nomination to the chair of the award selection committee by October 1, 2001. Letters of nomination should identify the nominee's areas of exceptional service, detailing the activities for which the nominee is believed to deserve this award. The nominee's current vita must be included with the nomination letter. The individual or individuals making the nomination have the primary responsibility for justifying why the nominee should receive this award. If given, the award will be presented in December at the 2001 Winter Simulation Conference in Arlington, Virginia (http://www.wintersim.org/).

A list of past winners of the award can be found at http://www.informs-cs.org/dsawin.html

Nominations should be sent to the Chair of the Selection Committee:

Dr. Jerry Banks, AutoSimulations, Inc.
1355 Terrell Mill Road, Building 1470, Suite 200, Marietta, Georgia 30067, USA
Email: jerry_banks@autosim.com
Phone: +1-770-955-1501, Fax: - 1592

Membership

Membership in the College on Simulation is independent of membership in The Institute for Operations Research and the Management Sciences. The annual membership fee for non-INFORMS members is $20.00; INFORMS members may join for $10.00. The fee for students and retired members is $5.00.

To join, send name, address, and e-mail address (if applicable), with the appropriate fee, to:

Susan M. Sanchez (Vice President)
Operations Research Dept,
Glasgow Hall
Naval Postgraduate School
Monterey, CA 93943, USA
SSanchez@nps.navy.mil
http://diana.or.nps.navy.mil/~susan

Info: http://www.informs-cs.org/

I M A C S
MATHMOD Conference Series

IMACS - The International Association for Mathematics and Computers in Simulation is an organisation of professionals and scientists concerned with computers, computation and applied mathematics, in particular as they apply to the simulation of systems. This includes numerical analysis, mathematical modelling, approximation theory, computer hardware and software, programming languages and compilers. IMACS also concerns itself with the general philosophy of scientific computation and applied mathematics.

IMACS is one of the international scientific organisations (with IFAC, IFORS, IFIP and IMEKO) represented in FIACC, the five international organisations in the area of computers, automation, instrumentation and the relevant branches of applied mathematics. Of the five, IMACS (which changed its name from AICA in 1976) is the oldest and was founded in 1956.

IMACS organises local and international scientific symposia and conferences, and sponsors publications in its fields of interest.

IMACS Publications

IMACS publishes three journals:

- "Mathematics and Computers in Simulation" is published by Elsevier Science Publishers, and is the main IMACS journal, containing articles of general interest in the fields of modelling and simulation, a book review section and the "News of IMACS".
- "Applied Numerical Mathematics" (published by Elsevier Science Publishers, presenting articles at the forefront of numerical computing.
- "Journal of Computational Acoustics" is published by World Scientific and is devoted to questions of computational wave propagation, large-scale computing and theory in computational acoustics.

IMACS Administration:

President : Prof. Dr. Robert Vichnevetsky (CS Rutgers University, NJ, USA)
Vice Presidents: Prof. Dr. John Rice (Purdue University, IN, USA) and Prof. Dr. Achim Sydow (GMD-FIRST, Berlin, Germany)
General Secretary: Prof. Dr. Robert Beauwens (Brussels Free University, Belgium)
Secretary: Peggy Siciliano

Contact Address

IMACS Administration
Rutgers University, Dept. of Computer Science
Brett Road-Hill Center, Piscataway,
NJ 08855, USA
e-mail: imacs@cs.rutgers.edu

MATHMOD Conference Series

In February 2000 the 3rd International IMCAS Symposium on Mathematical Modelling took place. These Conference Series was started in February 1994 with the 1st MATHMOD, followed in February 1997 by the 2nd MATHMOD.

An evaluation of the conferences has shown positive outcome, so that it was decided to follow the recommendation of many participants: to continue these conference series with 4th MATHMOD Conference

4th MATHMOD Vienna

Fourth International Symposium
on Mathematical Modelling

February 5 - 7, 2003

Vienna University of Technology

The scope of the conference covers theoretic and applied aspects of the various types of mathematical i.e. formal modelling (equations of various types, Petri nets, bond graphs, qualitative and fuzzy models etc.) for systems of dynamic nature (deterministic, stochastic, continuous, discrete or hybrid, etc.).

Comparison of modelling approaches, model simplification, modelling uncertainties, and the impact of items such as these on the problem solution, validation, automation of modelling and software support for modelling etc. will be discussed in special sessions as well as applications for control, design or analysis of systems in engineering and other fields of application, and learning networks in modelling, fitting models to real processes, model reduction.

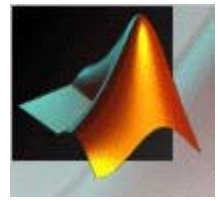
Further Information at the web:

http://argesim.tuwien.ac.at/4MATHMOD

Inge Troch
Inge.Troch@tuwien.ac.at

INDUSTRY NEWS

MATLAB - Expanded Presence and Student Versions in Europe



NATICK, MA. August, 2000 - The MathWorks, developer of MATLAB and Simulink technical computing software, announced it has dramatically expanded its direct sales and operations presence in Europe and has introduced consulting operations in Europe and the U.S. The company has acquired the operations of several long-time MathWorks distributors in France, Germany, Switzerland, and Benelux.

In Germany The MathWorks has taken over Scientific Computers' MATLAB related business units, including its staff, in Aachen, Munich and Bern. As a consequence, the newly formed company, The MathWorks GmbH, will be serving the German, Austrian and Swiss markets. The MathWorks GmbH is in the same locations that Scientific Computers has been operating from for the last years. Earlier this year, The MathWorks established a new office in Spain.

To significantly increase its consulting resources in Europe, The MathWorks acquired Auxilio, a firm that specializes in providing consulting services related to MathWorks products. The previously acquired Cambridge Control Ltd. sales and a consulting firm will now operate as The MathWorks UK, bringing the total number of MathWorks employees to ovwer 700 worldwide.

MATLAB® Student Version Release 12, is now available in Europe. Professional and commercial use is prohibited. MATLAB Student Version is for use in conjunction with courses at degree granting institutions.

MATLAB integrates computation, graphics, and programming in a flexible, open environment. Known for its highly optimized matrix and vector calculations, MATLAB offers:

- *MATLAB Student Version Highlights:*
- *Full-featured MATLAB (no limits)*
- *SIMULINK (with model size up to 300 blocks)*
- *Key functions of Symbolic Math Toolbox*

The MATLAB Student Version is available for $99 USD to students worldwide direct from The MathWorks.

Professors: if you are interested in purchasing software for students' home use, please inquire about our **customizable student group option** by contacting your sales representative.

The Mathworks Germany,
Friedlandstr. 18, D- 52064 Aachen, Tel: +49-241-47075-0, Fax: +49-241-47075-12 or
Siedlerstr. 2, D- 85774 Unterföhring / München, Tel.: +49-89- 995901-0,
Fax: +49-89- 995901-11
www.mathworks.de
www.mathworks.com

MathWorks to distribute and support MATRIXx

The MathWorks, Inc., the leading supplier of technical computing software for engineers and scientists, and embedded systems design software, and Wind River Systems, Inc. (Nasdaq: WIND), a leading provider of software and services for smart devices in the Internet age, today announced a definitive agreement for The MathWorks to license the distribution rights for the MATRIXx® product family from Wind River. MATRIXx is a set of software tools used in the development of real time embedded control systems. This new relationship, while maintaining customer support, will enable the two companies to more closely integrate their products to better serve key target markets.

Under the agreement, Wind River grants The MathWorks exclusive distribution rights of MATRIXx and an option to purchase MATRIXx at the end of the licensing agreement. The MathWorks will assume the support of MATRIXx and will provide a transition plan to its MATLAB® and Simulink® family of products for customers who choose to migrate. Customers will receive two years of support for MATRIXx products from The MathWorks beginning April 2, 2001.

In addition to the distribution agreement, Wind River and The MathWorks have identified several areas of partnership where the two companies will work closely to integrate MathWorks products, including Simulink and Real-Time Workshop®, and Wind River products, including the Tornado® integrated development environment, the VxWorks® real-time operating system (RTOS) and OSEKWorks™, an RTOS designed especially for the automotive market. These areas of partnership will allow Wind River and The MathWorks to better serve the automotive, aerospace and defense and industrial markets.

Liz Callanan, The MathWorks, Inc.
E-mail: lcallanan@mathworks.com

ACSL 11.8 Released

AEgis Research released Version 11.8. of the simulation tool ACSL (Advanced Continuous Simulation Language) for PC and workstations. This release includes a smoother user interface, a better installation procedure, the same „look" for the workstation and PC product and error corrections.

ACSL MATH and ACSL GM are now also available for most workstations. ACSL will be soon supported for the LINUX operating system on PCs and for GNU Fortran on both, the LINUX and Windows PC environments.

More flexible license conditions are offered for university users.

For more information contact:

BAUSCH-GALL GmbH,
Wohlfartstr. 21 b,
D-80939 Muenchen
phone ++49 89 3232625,
fax ++49 89 3231063,
email: info@Bausch-Gall.de
web: www.Bausch-Gall.de

hAMSter - first lowcost VHDL-AMS simulator

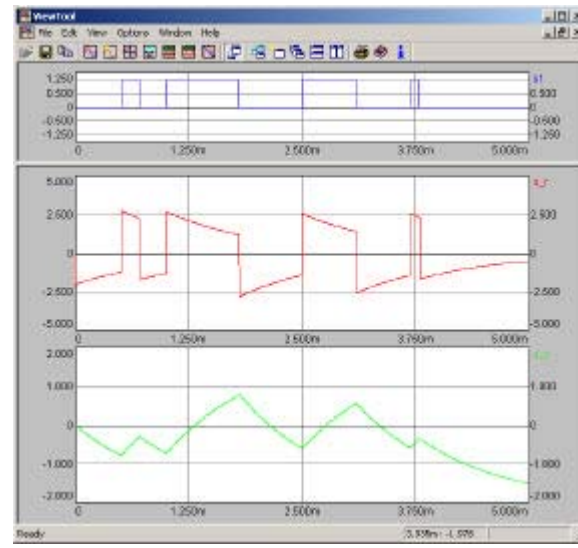
SIMEC GmbH & Co KG, Chemnitz, Germany, announces that their PC based VHDL-AMS simulator - hAMSTer - is available since begin 2001. hAMSTer stands for **h**igh performance **AMS t**ool for **e**ngineering and **r**esearch and is intended for desgners in education, research and development who are ionterested modeling using VHDL-AMS.

With the approval of the IEEE 1076.1 Standard in March last year the first time a general description language for analog mixed signal systems is available - VHDL-AMS.

Since this time companies are developing solutions for the implementation of the language standard into their simulation packages. Until today only a small number of companies really provide VHDL-AMS simulation. Most of them are integrated into large design environments - expensive, inflexible and difficult to use.

hAMSTer comes in a package with an easy-to-use and comfortable source code editor with syntax coloring. The user can create hierarchical models using already predefined designs.

A comprehensive example collection gives a good overview about the modeling capabilities of the language and the ease of model generation uswing VHDL-AMS. Once the model is defined, the user can choose from different integration algorithms and nonlinear solvers. In a simulator specific dialog all integration parameters and outputs can be defined.



For simulation results hAMSTer provides an online waveform display (View Tool) with digital and analog views. All waveforms are displayed during the simulation. The results can be stored in several file formats (ASCII, BINARY and Microsoft Access).

The software is fully WINDOWS compliant and supports all commo data exchange formats. The package contains the program modules, a language description (HTML) and an online help how to use the program.

Support will be available via e-mail or via our news server. hAMSTer is also distributed via internet (download) at http://www.hamster-ams.com. Price is less than 500$.

Contact

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SIMEC GmbH & Co KG.
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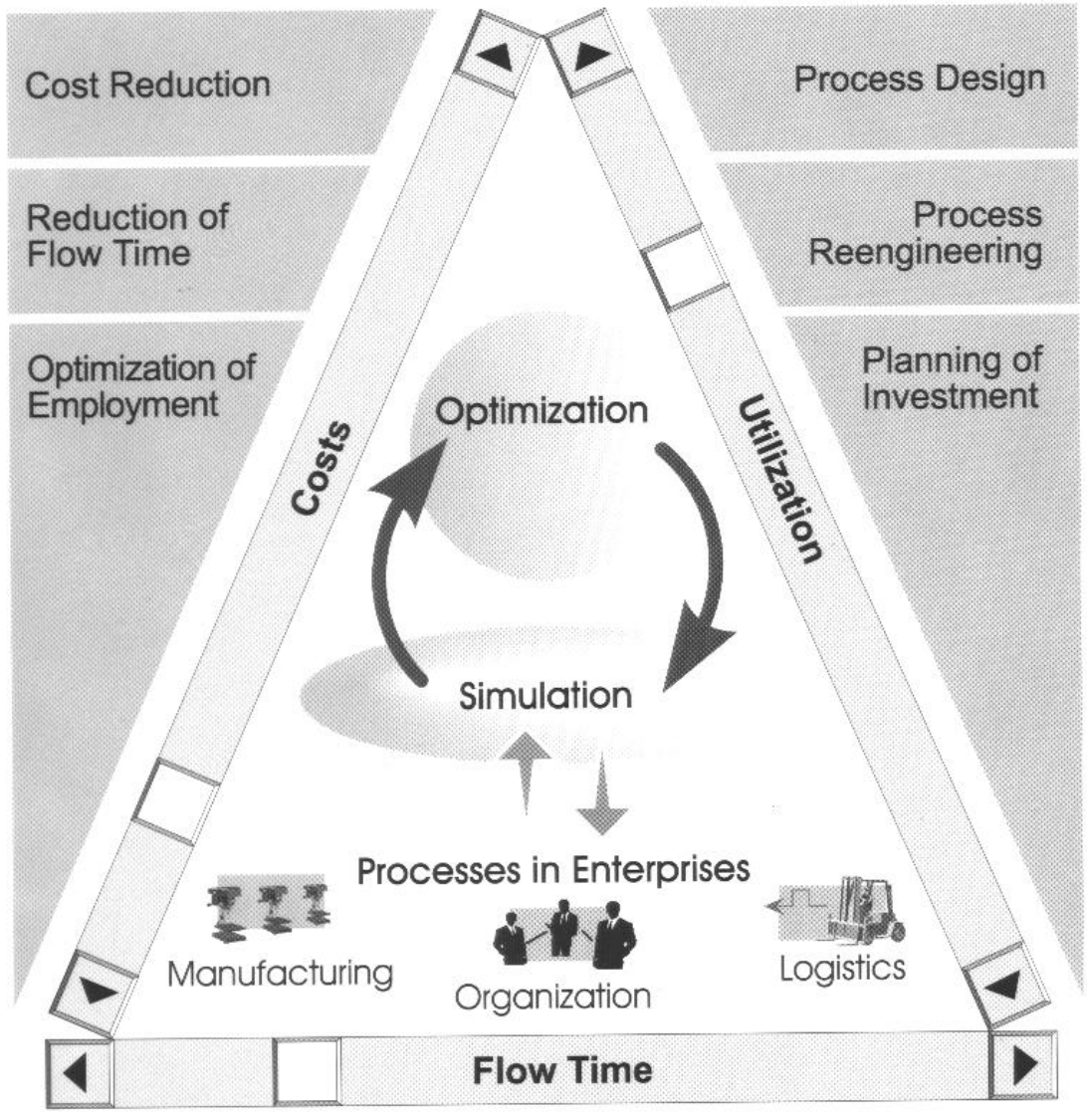
D-09113 Chemnitz, Germany
Tel +49 371 450 3 450
Email zacharia@simec.com

Your Objectives



Our Services

- Showing of Potentials for Optimization
- Computer-aided Simulation and Optimization
- Support during Realization
- To obtain further information contact Wilfried Krug, Jens Liebelt
  DUAL-ZENTRUM GmbH, Gillestraße 2, D-01219 Dresden,
  Tel: +49 351 47791 0 / Fax 47791 99, E-mail: wkrug@dual-zentrum.de,
  More details and references you can find in http://www.dual-zentrum.de

Löffler & Ass. organizes SIM'2001 Conference and Tradefair

June 2001, Freiburg

SIM 2001, is the first Industrial Trade Fair and Knowledge Exchange on Applied Simulation and Visualisation.
Special emphasis is given to enable an interdisciplinary discussion between experts and professionals with different core skills.

Conception and Supporters

SIM 2001 is a development of Löffler & Associates GmbH – Concept Engineering – in Switzerland and enjoys substantial support from major organisations: Hardware Companies (e.g. NEC, Compaq, HP, SGI, Sun Microsystems), Software Vendors (e.g. Fluent, MSC, CD-adapco), Research Institutes and Organisations (e.g. the German National Research Center for Information Technology, GMD, the IST-Programme of the European Union and the Arbeitsgemeinschaft Simulation, ASIM, Austria/Germany/Switzerland) support the establishment of SIM 2001 as the new European Market Platform. Their common goal is to push the competitiveness of the European Manufacturing Industry into a global lead position by promoting the efficient use of the new simulation and visualisation tools that are available.

The impact of simulation and visualisation on all fields of manufacturing is rapidly becoming an important factor in the serious efforts of industry to achieve sustainable, efficient and cost-effective production. Simulation and visualisation have a key role to play in

- *the strategic field: technological innovation, new products and new process technology, etc.*
- *the economic field: higher quality of products, faster time to market, more efficient product development, etc.*
- *the social field: simulation of risk management, traffic, efficiency in logistics, etc.*

Fair Conferences

SIM 2001 is being held in Freiburg i.Br., Germany, and takes advantage of the new trade fair facilities of Messe Freiburg. At this stage of the development of SIM 2001 the following individually organised conferences are taking place:

SIM 2001 Opening Reception, *June 17, 2001*

The SIM 2001 Opening Reception will be held for all exhibitors and conference delegates. At this opening ceremony, two leading figures from politics and industry will speak on the Reinforcement of the European High Tech Market.

SIM 2001 Industrial Trade Fair, *June 18 - 21, 2001*

The SIM 2001 Industrial Trade Fair is the international market place for applied simulation and visualisation. The hardware and software available, services and consultancy, as well as new technologies and applications for industry in the field of simulation (CFD, FEM, Moulding, Crash, Kinematics, Process Simulation, Robotics, Logistics etc.) and Visualisation tools (3D-Visualisation, Virtual Reality, etc.) will be presented.

Simulation and Visualisation 2001 Conference*, June 19, 2001, 9am - 6pm*

The Importance of Simulation and Visualisation for Industry in the Next Decade

5th World Fluid dynamics Days 2001, Official WUA-CFD-Conference*, June 17-21, 2001*

CFD and the Economic Benefit in Manufacturing

Modeling and Simulation in Education, June 20, 2001, 9am - 1pm

In co-operation with SC - McLeod Centers

Exhibition

The SIM 2001 Exhibition includes the following product sectors:

- *Computer Hardware, Supercomputers, Workstations, Distributed Computing Systems, PC's, and further hardware-developments (interfaces, mass storage systems, etc.).*
- *Simulation-Software: CFD, FEM, Molding, Crash, Weather, Climate, Kinematics, Product Simulation, Process Simulation, Simulation of Intelligent Systems (e.g. Robotics, Transport, Manufacturing), and further software in related fields.*
- *Visualisation Hard- and -Software, Visualisation Tools, 3-d-Visualisation, Virtual Reality*

Contact

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"SIM 2001", P.O. Box, CH - 4021 Basel, CH
Tel: +41-61-695 93 95; Fax: +41-61-695 93 90
E-mail: loeffler@sim2001.com
WWW: http://www.sim2001.com

CALENDAR OF EVENTS

Simulation Conferences

May 2001

03-03 **MATLABSEM'2001** MATLAB – Seminartagung Vienna Univ. of Technology, Austria
http://www.argesim.org

15-18 **15th Workshop on Parallel and Sistributed Simulation**, Lake Arrowhead, California, USA
deelman@cs.ucla.edu,
http://www.ececs.uc.edu/~paw/pads2001/

28-31 **SimTecT 2001**. Simulation Conference and Exhibition, Canberra, Australia
http://www.siaa.asn.au/simtect/2001/2001.htm

June 2001

07-09 **ESM '2001**. 15th European Simulation Multiconference, Prague, Czech Republic
http://hobbes.rug.ac.be/~scs/

12-14 **M²SABI'01**. 4th International Symposium on Mathematical Modelling and Simulation in Agriculture and Bio-Indus, Haifa, Israel
Contact :peo@tx.technion.ac.il,
http://www.technion.ac.il/technion/agr/m2sabi0.html

17-21 **SIM 2001**. Trade Fair and Conferences "International Knowledge Exchange in Applied Simulation and Visualisation", Freiburg im Breisgau, Germany
loeffler@sim2001.com,
http://www.sim2001.com

17-21 **WUA-CFD 2001**. World Fluid Dynamics Days, Freiburg im Breisgau, Germany
loeffler@sim2001.com,
http://www.sim2001.com

18-23 Fourth St. Petersburg Workshop on Simulation, St. Petersburg, Russia
http://vega.math.spbu.ru/workshop/2001/

19-22 **ITI 2001**. 23rd Int. Conference Information Technology Interfaces, Pula, Croatia
Conference Secretariat ITI 2001, University Computing Centre, Josipa Marohnica bb, HR-10000, Zagreb, Croatia,
iti@srce.hr,
http://www.srce.hr/iti/

25-27 **ESIW 2001**. 2001 European Simulation Interoperability Workshop, Univ. of Westminster, Harrow, UK
http://www.sisostds.org/siw/01Euro/index.htm

25-27 **HPCN Europe 2001**. High Performace Computing and Networking in Europe, Amsterdam, Netherlands
hollenberg@sara.nl,
http://www.wins.uva.nl/events/HPCN2001/

25-29 **Petri Nets 2001**. 22nd Int. Conf. On Application and Theory of Petri Nets, Newcastle upon Tyne, UK
http://www.cs.ncl.ac.uk/conferences/2001/pn/

26-29 **BioMedSim'01 / EUROSIM 2001**. Biomedical Simulation / in EUROSIM 2001, Delft, The Netherlands
hamam@esiee.fr,
http://www.esiee.fr/~hamamy

26-29 **EUROSIM 2001**. 4th International EUROSIM Congress, Delft, The Netherlands
Mrs. T. Tijanova,
Delft University of Technology, Faculty of Information Technology and Systems,
eurosim2001@pa.twi.tudelft.nl,
http://ta.twi.tudelft.nl/PA/Eurosim2001/

July 2001

03-10 **MODELLING 2001**. 2nd IMACS Conference on Mathematical Modelling and Computational Methods in Mechanics, Physics and Geodynamics, Pilsen, Czech Republik
mika@kma.zcu.cz

15-19 **SCS 2001**. 2001 Summer Computer Simulation Conference, Orlando, Florida
sbranch@scs.org,
http://www.scs.org/confernc/scsc01/scsc2001cfp.html

25-27 **11th INFORMS** Applied Probability Society Conference, New York City
http://www.conference.com/informsApplied/

September 2001

10-14 **MCM 2001**. 3rd IMACS SEMINAR ON MONTE CARLO METHODS, Salzburg, Austria
mcm2001@cosy.sbg.ac.at,
http://mcm2001.sbg.ac.at

11-14 **ASIM 2001**. 15. ASIM Symposium Simulationstechnik, Paderborn, Germany
Prof. Dr.-Ing. F. Dörrscheidt, Universität Paderborn, FB Elektrotechnik und Informationstechnik,
Pohlweg 47-49,
D-33098, Paderborn,
asim2001@rt.upb.de,
http://www-rt.upb.de/ASIM2001/

October 2001

14-19 **VIM-01**. International Symposium on Visualization and Imaging in Transport Phenomena, Antalya, Turkey
arinc@metu.edu.tr
http://www.ida.liu.se/~pelab/sims

17-18 **SIMS 2001**. SIMS Conference 2001, Porsgrunn / Oslo, Norway
Bernt.Lie@hit.no

ESS 2001. European Simulation Symposium 2001, Marseille, France
http://hobbes.rug.ac.be/~scs/conf/index.html

December 2001

10-13 **MODSIM 2001**. International Congress on Modelling and Simulation, Australian National University, Canberra
fredg@cres.anu.edu.au,
http://cres.anu.edu.au/~tony/modsim2001.htm

Further detailed information on conferences can be found on

http://www.argesim.org/conferences/

Simulation Classes

Organiser: *AIC American Interface Corporation*
Title: **Mathematical Modeling and Digital Computer Simulation of Engineering and Scientific Systems.**
Date: *May 28 - June 1, 2001*
Location: *ETH Zuerich*
Lecturers: *W.J. Karplus (UCLA, USA); H.J. Halin (ETH Zurich, CH); J.U. Thoma (CH, form. Univ. of Waterloo, CDN);*
Contact: *H.J. Halin, Tel: +41-1-632 4608 or 4603;*
Fax: -1166, email: halin@iet.mavt.ethz.ch
WWW: http://www.lkt.iet.ethz.ch/lkt/courses

Organiser: *BAUSCH-GALL GmbH, D - 80939 Munich*
Title / date*:* **Dymola mit Modelica**. *26./27. April 2001, 29./30.Nov.2001*
Title / dates: **Simulink mit MATLAB-Einführung**. *7.-9. May 2001, 10.-12. Oct. 2001, 3.-5. Dec. 2001*
Title / dates*:* **MATLAB-Anwendung***:*
25./26. June 2001, 12./13. Nov. 2001
Title / dates**: Pspice***: 15./16. May 2001, 23./24. Oct. 2001, 11./12. December 2001*
Title / dates*:* **Effektive Simulation von Schaltnetzteilen**.
17. May 2001, 25. Oct. 2001, 13. Dec. 2001
Title / dates*:* **Effektive Regelung von Schaltnetzteilen**.
18. May 2001, 26. Oct. 2001, 14. Dec. 2001
Location*: Munich, Germany*
Contact: *BAUSCH-GALL GmbH, Wohlfartstrasse 21 b, D-80939 Muenchen, Tel. +49/89/3232625,*
Fax: +49/89/3231063; email: info@Bausch-Gall.de
WWW: http://www.bausch-gall.de/

Organiser: *ARGESIM - Technical University Vienna*
Title / date: **MATLAB Seminar,** *May 03, 2001*
Title / date: **Seminar "Discrete Simulation with TalorED".**
May 29, 2001
Title / date: **Seminar "Discrete Simulation: Petri nets and Optimisation".** *June 19, 2001*
Title / date: **Seminar "Hybrid Simulation with AnyLogic".**
Oct. 25, 2001
Title / date: **Seminar "Computer Algebra Systems in Modelling and Simulation".** *Nov. 13, 2001*
Title / date: **Seminar "Discrete Simulation: Petri nets and Oprimisation".** *Dec. 17, 2001*
Location: *Vienna University of Technology (TU Vienna)*
*S*Contact: *ARGESIM, TU Vienna, Tel: +43-1-58801-11455, Tel: +43-58801-42098; Email: info@argesim.org*
WWW: http://www.argesim.org

SNE EDITORIAL BOARD FOR NEWS SECTION

SNE is the official membership journal of EUROSIM and sent to most members of the EUROSIM Societies as part of the membership benefits. Furthermore SNE is distributed to the members of SCS Europe, and to User Groups and for promotional purposes via ARGESIM

If you have any information you want to see published, please contact the corresponding member of the editorial board (society news, conference announcements, conference reports, events, etc.).

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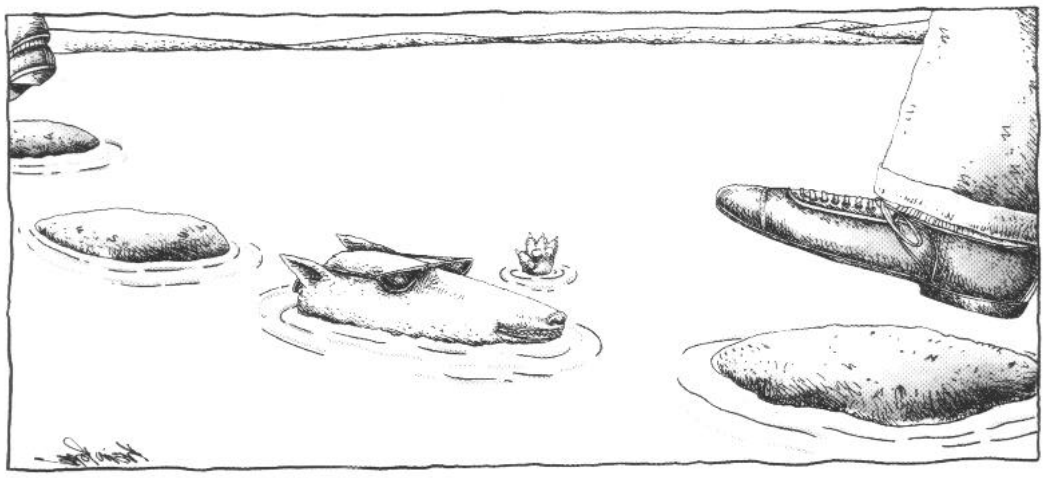
The dependability of the Wolverine is well-known in these parts.



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ARGESIM SERVICE - SNE SUBSCRIPTION

ARGE Simulation News (ARGESIM) is a non-profit working group disseminating information on simulation, organising activities in the area of modelling and simulation (e.g. courses, comparative studies), publishing journals and books in this area, and providing the infrastructure for the administration of EUROSIM and ASIM activities.

ARGESIM works at three levels:

- European and International Activities: Journal SNE (editing and publishing; printing and WWW - publication), ARGESIM Comparisons on Simulation Technique and Simulation Software, Publication of Books, EUROSIM WWW - Server, Calendar of Simulation Conferences, List of Simulation Hotlinks

- Regional Activities: publication of ASIM-Nachrichten and User Group Newsletters, administration for ASIM and for User Groups, ASIM WWW - Server, WWW - servers for Austrian Research Centres (medinet.org, etcanet.org)

- Local Activities: seminars "Modelling and Simulation", simulation software support at Vienna University of Technology, various simulation projects

ARGESIM's webserver is at present re-organised, especially the service for the calendar of simulation conferences and for the simulation hotlink list is improved (see webpage figure).

Simulation News Europe is sent to most members of the simulation societies in EUROSIM, to the European SCS members and to User Groups, etc. A personal subscription for SNE is also offered - see subscription from at the right, or contact:

http://www.argesim.org/sne/subscribe

SIMULATIONISTS PERSONALITIES

This new SNE corner follows two aims: to introduce young simulationists or simulationist of the rising generation, resp., and to report about awards and personal events. In both cases a curriculum vitae gives inside into the carrier of the simulationist:

- A young researcher or simulationist of the rising generation will be introduced in this corner, if e.g. his Ph.D. thesis is outstanding, or if he has got a research position, if he has got his first professorship or leading position, etc.
- Simulationists with high reputation often receive awards, or they are honoured in symposia, etc - these events will be reported here too.

This issue continues the new corner by introducing two "simulation ladies", Vlatka Hlupic (United Kingdom - Croatia) and Sigrid Wenzel (Germany) and by reporting about the 2000 INFORMS College on Simulation Distinguished Service Award given to Felix Breitenecker as first European.

Vlatka Hlupic

Eur Ing Dr Vlatka Hlupic is a Senior Lecturer in the Department of Information Systems and Computing at Brunel University, United Kingdom and the Director of Brunel Centre for Knowledge and Business Process Management.

She received a *Dipl.Econ*. and an *M.Sc* in Information Systems from the University of Zagreb, and a *Ph.D* in Information Systems at the London School of Economics, England. Dr Hlupic has also obtained various professional qualifications such as: Chartered Engineer (*CEng*), European Engineer (*Eur Ing*), member of the British Computer Society (*MBSC*) and member of the Institute of Teaching and Learning in Higher Education (*MILT*).

She is also a member of several other professional organisations including IEEE, the Operational Research Society of Great Britain, UK Simulation Society, Croatian Simulation Society and UK Academy of Information Systems.

Dr Hlupic has published over 100 papers in refereed journals, books and conference proceedings mainly in the area of simulation modelling and business process change.

She is an Associate Editor of *Simulation*, and has co-edited several special issues of the *International Journal of Flexible Manufacturing Systems* on business process modelling. She has obtained several research grants for her research projects such as "The Intelligent System for Simulation Software Selection", "Investigating the Role of IT for Business Process Re-engineering", "Evaluation of Knowledge Management Software Tools" and "Simulation of Flexible Manufacturing Systems". She is also acting as an expert advisor for several research projects both in the UK and Croatia.

Her current research interests are in simulation software evaluation and selection, simulation of business processes, knowledge management, the use of intelligent agents for knowledge management in e-commerce, e-learning and personal knowledge management.

In addition to her academic research, Dr Hlupic acts as a consultant for a variety manufacturing and service companies advising on simulation software selection, simulation modelling and business process change facilitated by business process modelling.

Dr Hlupic has presented her research work at over 50 international conferences. She has given numerous invited talks at various national and international meetings, including a keynote presentation at UK-SIM'01 in Cambridge.

She has been a member of numerous International Programme Committees for international conferences and a member of editorial boards for several international journals. She acts as a referee for over 10 international journals including *Journal of the Operational Research Society, Simulation, SCS Transactions on Simulation and IEEE Transactions on Parallel and Distributed Systems*.

Due to an international recognition of her work, Dr Hlupic's biography has been regularly published since 1999 in Marquis Who's Who in the World, Who's Who in Science and Engineering and in The Europe 500 – Leaders of the New Century.

In addition to her professional work, Dr Hlupic has various other interests and activities. For example, she has obtained training in areas such as Educational Kinesiology, Personal Effectiveness, Super Memory Skills, Photo Reading Skills and Neuro-Linguistic Programming.

She is also very interested in complementary medicine, art, charity work, and most importantly in upbringing of her son Tomislav.

Vlatka Hlupic Vlatka.Hlupic@os-mailhost.brunel.ac.uk

Sigrid Wenzel

Head of the Department for »Simulation Concepts and Instruments« at the Fraunhofer Institute for Material Flow and Logistics (Fraunhofer IML) in Dortmund and deputy main division manager; assistant professor at the technical college of Dortmund and last but not least mother of a four-year old daughter.

Following my studies of information sciences at the University of Dortmund I worked from 1986 until 1989 as full time scientist at the chair of Materials Handling and Warehousing at the University of Dortmund.

In 1990 I started my scientific work at the Fraunhofer IML in Dortmund in the fields: simulation and modelling concepts, visualisation methods for the discrete-event simulation and distributed architectures in production and logistics. In 1998 I published my scientific work in the fields visualisation and simulation technology in my doctoral thesis with the title »Improvement of the information structure in simulation technology through the use of an autonomous visualisation tool«.

I wrote my thesis at the University of Rostock under the supervision of Prof. Dr. H. Schumann, and Prof. Dr. J. Encarnanção, Technical University of Darmstadt, and Prof. Dr. A. Kuhn, University of Dortmund.

My present work is focused on the use and development of user-individual visualisation methods for simulation in production and logistics as well as the modelling processes in simulation, especially on the development of reference models.

This work also resulted in the book »Reference models for simulation in production and logistics« which I edited in 2000 as head of the ASIM group »Simulation in production and logistics«.

In addition to my work on research and industrial projects at the Fraunhofer IML I also act as an active member in various committees, e. g. of ASIM and VDI.

Since 1992 I am member in the German Society for Simulation ASIM, at present vice-spokeswoman of the ASIM board of directors, and since 1999 head of the ASIM working group »Simulation in Production and Logistics«.

In the VDI-Committee A5 »Modelling and Simulation« in the VDI-Gesellschaft Fördertechnik Materialfluss Logistik VDI-FML (VDI Society Transport Material Flow Logistics) I have the opportunity to take influence on current standards of VDI-Guideline 3633 »Simulation of logistic, material flow and production systems« and to talk to potential users of the simulation technology. Since 1998, as leader of the Professional Committee of VDI for part 11 »Simulation and Visualisation« I have elaborated a guideline for this field in Germany.

I have been a lecture assistant at the technical college of Dortmund since 1998: my lessons are basics and application of discrete-event simulation as well as graphical and animation systems.

Sigrid Wenzel, wenzel@iml.fhg.de

Felix Breitenecker - INFORMS DSA - Award 2000

Professor Doktor Felix Breitenecker of the Technische Universität Wien (Vienna University of Technology) received the 2000 INFORMS College on Simulation Distinguished Service Award during the College's business meeting at the 2000 Winter Simulation Conference in Orlando.

The award, first given in 1986, recognizes each year at most one individual who has "... provided long-standing, exceptional service to the simulation community ... sustained over a period of 15 to 20 years or longer and [has been] acquitted with distinction." The selection committee was composed of Bruce Schmeiser (Purdue University) serving his third and final year, Jerry Banks (AutoSimulations, Inc.) serving his first year, and was chaired by David Kelton (University of Cincinnati) serving his second year.

Felix Breitenecker, left, receives the award from committee chair David Kelton

Quoting from the nomination letter, "Prof. Dr. Felix Breitenecker has been and is an enormous force in the European simulation community and, through that community, beyond. His service roles in the community began some seventeen years ago, in 1984, and show no sign of abating. These roles have taken the form of leadership requiring people skills (e.g., President of EUROSIM; President of ASIM; organizer of numerous conferences and short courses); service requiring technical expertise (e.g., again, organizer of numerous conferences and short courses; editor of numerous conference proceedings; editor of the journal Simulation News Europe (SNE), author of over 200 articles; lecturer in a wide range of venues and capacities beyond normal credit-course teaching; chair of thirteen doctoral dissertations; director of over 70 master's degree theses); and imaginative use of his leadership opportunities (e.g., opening EUROSIM to Eastern European countries; encouraging national simulation societies by introducing the idea of EUROSIM "observer members"; working toward the incorporation of the former East Germany into ASIM; acting to help bring about a cooperative working relationship between ASIM/EUROSIM and SCS-Europe ... His 'audience,' although much more heterogeneous (and therefore probably more challenging to serve) than in North America, is as large as North America."

Dr. Breitenecker was involved in the founding of EUROSIM, the Federation of European Simulation Societies, currently encompassing 13 independent national simulation societies EUROSIM publishes a scientific journal, *Simulation Practice and Theory*, begun during Felix's presidency of EUROSIM, and also publishes *Simulation News Europe* three times each year.

As President of EUROSIM, Professor Dr. Breitenecker extended membership to eastern European countries, and established the concept of "observer" members for fledgling national simulation societies (currently Spain, Poland, and Romania).

He also undertook many of the tasks of organizing the EUROSIM'95 Simulation Congress in Vienna, which attracted some 500 participants from 41 countries. Again quoting from the nomination letter, "... Breitenecker was truly the 'iron man' of this major European simulation conference."

He continues as Editor-in-Chief of *Simulation News Europe*, where one of his many innovative ideas has been the "Series of Comparisons of Simulation Software," which to date has published some 13 comparison problems and 189 solutions using a range of simulation software.

In addition to the pan-European scope of EUROSIM, Dr. Breitenecker is currently Board Chair for ASIM (Arbeitsgemeinschaft SIMulation, the German-language simulation society (Austria, Germany, and the German-speaking parts of Switzerland), and has served on its Executive Board continuously for 17 years. He has chaired two ASIM conferences in Vienna, in addition to editing their *Proceedings*, and has brought to fruition over 70 ASIM publications, as well as two book series. ASIM membership has been handled by Felix for the past 17 years, and has grown from 119 to nearly 700 today. He played a critical role in incorporating the former East Germany into ASIM in the early 1990s.

Extending his work to bring simulationists together across Europe, Dr. Breitenecker has been active in SCS-Europe. He helped combine the ASIM and SCS-Europe book series, was instrumental in making *Simulation News Europe* the membership publication of SCS-Europe (while continuing to play that role for EUROSIM), and coordinated the joint staging of several conferences between ASIM and SCS-Europe.

To serve the dual purposes of reaching out to European industry and providing an administrative structure for ASIM and EUROSIM, Dr. Breitenecker established and maintains a non-profit working group called ARGESIM (ARbeitsGEmeinschaft SIMulation Neuigkeiten). ARGESIM serves as the publisher for *Simulation News Europe*, and has organized some 65 seminars in cooperation with universities and industry, which are attended by students, faculty, and people from industry.

In sum, Prof. Dr. Felix Breitenecker has chaired six conferences and 17 workshops, organized 12 paper sessions at other international conferences, and has organized five international seminars. He has consistently been at the very center of many if not most of the main simulation events and societies in Europe for nearly 20 years, and has been a mainstay of simulation activity in Europe and beyond. And so the INFORMS College on Simulation is proud to present its 2000 Distinguished Service Award to Prof. Dr. Felix Breitenecker.

Felix Breitenecker can be reached via Email at felix.breitenecker@tuwien.ac.at.

For the Call for Nominations for the 2001 Award, and for a list of past winners, please visit http://www.informs-cs.org/dsaward.html.

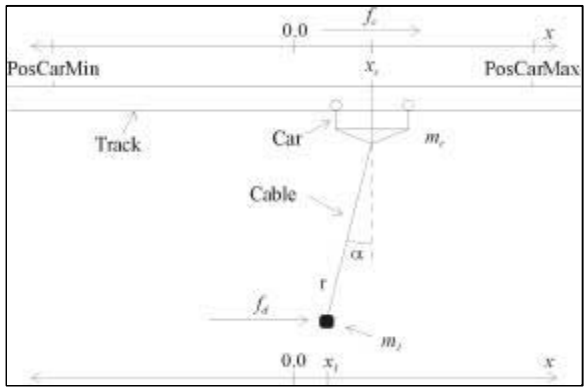
W. David Kelton, University of Cincinnati, USA
david.kelton@uc.edu

COMPARISONS OF SIMULATION TOOLS AND SIMULATION TECHNIQUES

Definition: C13 Crane and Embedded Control

This Comparison originates from a publication of E. Moser and W. Nebel in Proc. DATE'99 (Eduard Moser and Wolfgang Nebel, Case Study: System Model of Crane and Embedded Control, Proc. DATE'99, pages 721-724).

An embedded system should be developed for controlling a crane. The crane moves along a horizontal track and transports a load to a certain position. The car of the crane is driven by the force f_c, which is released from a dc-motor that is controlled by a digital controller. The load is connected to the car by a cable of length r. Several sensors provide information about the current state of the system and actuators to control the crane.



Definition of the Crane Mecanics

In the following the nonlinear and linear equations for the system for x_c, x_l and α are given:

$$\ddot{x}_c = \frac{f_c}{m_c} + g * \frac{m_l}{m_c} * \quad - \frac{d_c}{m_c} * \dot{x}_c$$

$$r^{\cdot\cdot} = -g * \left(1 + \frac{m_l}{m_c}\right) * \quad + \left(\frac{d_c}{m_c} - \frac{d_l}{m_l}\right) * \dot{x}_c -$$

$$- r * \frac{d_l}{m_l} \cdot - \frac{f_c}{m_c} + \frac{f_d}{m_l}$$

$$x_l = x_c + r *$$

Linear model

(A linear description of the crane can be found in O. Föllinger, Regelungstechnik, 1985. F. Breitenecker and H. Ecker derived the nonlinear equations used here. The linear version given originates from the publication of Moser and Nebel mentioned above.)

The disturbance (e.g. wind) is modelled as the external force f_d accelerating the load.

The following constants are assumed:

m_c = 10.0 kg, m_l = 100.0 kg, g = 9.81 m*sec^{-2}, d_c = 0.5 sec^{-1}, d_l = 1.0 sec^{-1}, r = 5.0 m.

Specification of the embedded control

The embedded control includes sensors, actors, the control and the diagnosis.

Actuators

DC-Motor:
The car is driven by a dc-motor, which releases the force f_c. As a motor model a first-order time-delay is used:

$$t_m * \dot{f}_c + f_c = k_m * v$$

$$v = VC * volt$$

t_m = 1.0 sec; k_m = 4.0 N*volt^{-1}; v is limited to abs(v) ≤ VMax, VMax = 40.0 volt.

$$\ddot{x}_c * [m_c + m_l \sin^2(\ )] = -d_c \dot{x} + f_c + f_d \sin^2(\ ) + m_l \sin(\ ) [r^{\cdot 2} + g \cos(\ )] - d_l \dot{x} \sin^2(\ )$$

$$\ddot{r}^2 * [m_l \sin^2(\ ) + m_c] = \left[f_d \frac{m_c}{m_l} - f_c + d_c \dot{x} \right] * r \cos(\ ) - [g(m_l + m_c) + m_l r^{\cdot 2} \cos(\ )] * r \sin(\ ) -$$

$$- d_l \left[\frac{m_c}{m_l} (\dot{x} r \cos(\ ) + r^{2\cdot}) + r^{2\cdot} \sin^2(\ ) \right]$$

$$x_l = x_c + r \sin(\ \ \ )$$

Nonlinear model

Brake:

Sets VC = 0.0, and the car stops immediately.

Emergency Stop:

Sets VC = 0.0. All further activity is blocked, the car stops immediately.

Sensors

PosCar Position of the car (x_c [m])

SwPosCarMin Range sensor with Boolean value, is true if x_c < PosCarMin, PosCarMin = -5.0 m

SwPosCarMax Range sensor with Boolean value, is true if x_c > PosCarMax,
PosCarMax = 5.0 m

Alpha Angle of the cable (α [rad]), the sensor is constrained to abs(Alpha) < AlphaMax+ΔAlpha, with AlphaMax = 0.2 rad, ΔAlpha = 0.01.

Definition of control

Control is implemented as a cycle based control algorithm with a fixed cycle time of 10 msec. The index n numbers the time points within the following difference equations. The output VC is given as:

$$q_n = [q_{1_n}, q_{2_n}, q_{3_n}, q_{4_n}, q_{5_n}]^T$$

$$q_{n+1} = A * q_n + B * \begin{bmatrix} VC_n \\ PosCar_n \end{bmatrix}$$

$$y_n = K * q_n$$

$$z_n = \begin{cases} PosCar + r * q_{2_n} & \text{if Emergency Mode} \\ PosCar + r * Alpha & \text{otherwise} \end{cases}$$

$$u_n = k_p * (PosDesired - z_n)$$

$$VC_n = \begin{cases} +VcMax & \text{if } u_n - y_n > +VcMax \\ -VcMax & \text{if } u_n - y_n < -VcMax \\ u_n - y_n & \text{otherwise} \end{cases}$$

Parallelly the condition for activating the brake is observed:

```
If (not EmergencyMode and abs(VC) < 0.01 for
3 sec) or
(EmergencyMode and abs(VC) < 0.01 for 6 sec)
then
apply the brake (set Brake).
```

```
A=[9.9950e-1,  9.8040e-1,  9.9444e-4, -2.9370e1,  4.9032e-3;
   4.9882e-7,  9.9892e-1, -9.9632e-7,  4.8569e1,  9.9963e-3;
   0        ,  0        ,  9.9004e-1, -5.2731e4,  0;
   9.9975e-3,  4.9033e-3,  4.9817e-6,  9.9757e-2, 1.6346e-5;
   9.9739e-5, -2.1569e-1, -1.9888e-4, -9.5679e1,  9.9892e-1];

B=[ 1.9926e-5,  2.9370e1;
   -1.3296e-8, -4.8569e1;
    3.9800e-2,  5.2731e4;
    6.6485e-8,  9.0024e-1;
   -3.9853e-6,  9.5679e1];

K=[1.0906e3, -3.2981e3, 5.7106, 0, 3.0647e3];
kp=5.5e2;
```

Diagnosis

The Diagnosis runs concurrently to the control algorithm.

- Observe the range sensors:
  `if (SwPosCarMin ∨ SwPosCarMax) for more then 20 msec during 100 msec then set EmergencyStop.`
- Observer plausibility of angle sensor:
  `if (abs(Alpha) ≥ AlphaMax for more than 50 msec during 100 msec then set` EmergencyMode (herafter the control algorithm works without the angle sensor).

Tasks

For validation of the models the following set of tests should be executed. First present the general implementation idea and state if the used simulation tool can derive the linear model from the implemented nonlinear one, or not.

Task 1

Implement the system (crane and motor) once with linear equations (for the crane machanics) and once with nonlinear equations. Compare the linear and nonlinear models without controller and without brake:

Initial position `PosCar=0.0`, f_d=`0.0`,

At time 0 set `VC=40` for 15 sec, then `VC=0.0`;

At time 4 set f_d=`Dest` for 3 sec, then f_d=`0.0`;

Print a table showing the steady-state difference in x_L for `Dest=-750, -800, -850` respectively.

Task 2

Implement the controller and brake with the dc-motor and the linear system (for the crane mechanics) and complete the following jobs:

At time t = 0: PosCar = 0.0, f_d = 0.0, PosDesired = +3.0

At time t = 16: PosDesired = -0.5

At time t = 36: PosDesired = 3.8

At time t = 42: f_d = -200 for 1 sec then f_d = 0.0

Print a transient diagam showing x_c, x_l, α, state the time of brake-on events.

Describe how the continuous system and the descrete controller work together and how the brake is implemented.

Task 3

Add the sensor diagnosis to the system of task 2 and complete the following jobs:

At time t = 0: PosCar = 0.0, f_d = 0.0, PosDesired = +3.0

At time t = 16: PosDesired = -0.5

At time t = 18: Angle sensor brakes which sets Alpha = AlphaMax + 0.05 permanently

At time t = 36: PosDesired = 3.8

At time t = 42: f_d = 200 for 1 sec, then f_d = 0.0

Print a transient diagam showing x_c, x_l, α, state the time of brake-on, emergency-mode and emergency-stop events.

State how the emergency mode and the emergency stop are handled.

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Solutions

We invite all readers to participate in this comparison. Please, simulate the model(s) with any tool of your choice and send in a solution.

A solution should consists of: 1. a short description of the simulator, 2, modelling technique, model description, 3. results of the three tasks

Additionally we ask for: 1. suggestion for classification, 2. model codes, if available

The solution should fit into one page of SNE - templates and already published solutions can be found at the web. Solutions sent in are reviewed with respect to completeness of tasks and comparability. Source codes of model and / or experiment description are highly appreciated: they are also put on the web, so that readers can experiment with the models, if they have the specific simulator available.

Overview

Use the ovierview given below, to find all the comparisons and their definitions and solutions in the various SNE issues, or on the Web

http://www.argesim.org/comparisons/

SNE	Comparisons													
	C1	C2	C3	C4	C5	C6	C7	CP1	C8	C9	C10	C11	C12	C13
0	Def													
1	5	Def												
2	4	4	Def											
3	4	3	3	Def										
4	1	5	5	2	Def									
5	4	-	1	1	2									
6	-	2	-	2	1	Def								
7	1	2	1	2	-	1	Def							
8	-	1	-	-	-	1	3							
9	-	-	-	-	-	2	3							
10	1	2	-	-	-	1	2	Def/1						
11	2	2	1	-	1	-	-	2						
12	1	-	1	-	-	-	2	3						
13	-	-	-	-	-	-	3	1						
14	3	-	1	-	-	-	2	-						
15	-	-	1	-	1	-	-	-						
16	1	-	-	-	-	-	1	-	Def/1					
17	-	-	1	-	1	-	1	1	1	Def/1				
18	-	-	-	-	-	-	2	2	-	-	Def/1			
19	-	-	-	-	-	-	-	1	1	1	3			
20	-	-	-	-	-	-	1	-	1	1	2			
21	-	1	-	1	-	1	5	-	-	-	2			
22	1	-	1	-	1	-	5	-	1	-	-	Def/1		
23	-	2	-	-	-	-	-	-	-	2	-	1		
24	1	-	-	1	-	-	2	-	-	-	1	2		
25	-	1	-	-	1	-	-	-	-	3	1	1		
26	2	1	2	1	1	-	1	-	-	1	1	1		
27	-	-	1	-	-	-	-	-	-	2	1	-	Def/2	
28	-	-	2	-	1	-	-	-	-	2	-	-	2	
29/30	1	1	1	1	-	3	-	-	-	-	1	-	3	
31	-	-	-	-	-	-	1	-	-	-	-	1	3	Def/1
Total	32	27	22	11	10	9	34	11	5	13	13	7	10	1

C13 Crane and Embedded Control - MATLAB

Numerical Simulation / Event-oriented Model

Simulator: MATLAB is a widely used software tool based on numuerical vector and matrix manipulation. Simulink is a graphical extention for block oriented simulation. S-functions provide a mechanism for extending the capabilities of Simulink by adding user defined blocks. The functionality of these blocks is defined in m-code or some programming language.

The model: The mechanics of the linear system and the DC-motor were implemented directly with Simulink, whereas the nonlinear model was programmed as an s-function. The 'Discrete-State-Space'-block of Simulink was used for the controller.

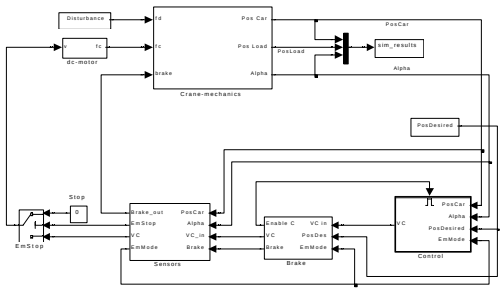

Figure 1: Simulink Model

Task I: The following table lists the differences of linear and nonlinear model in x_1:

Disturbance	Δx_1 (lin-nonlin)
-750	-0.0062
-800	-0.0521
-850	-0.0383

Task 2: Brake-control was programmed with an s-function that offers a comfortable way to define descret logic:

```
function sys=mdlUpdate(t,x,u,VClimit,TEmMode,
TNotEmMode) …
% release brake if there is a new PosDesired
if u(3) ~= x(3)
    sys(3)=u(3);sys(2)=0;sys(1)=t;
% check cond. for brake, set x(2), hold if set
elseif (u(2) & (t-x(1)>TEmMode)) | x(2)
    sys(2)=1; sys(3)=x(3);
elseif (~(u(2)) & (t-x(1)>TNotEmMode))
    sys(2)=1; sys(3)=x(3);
else            % no brake
    sys(2)=0; sys(3)=x(3);
end
```

Figure 2 shows the diagrams for `PosCar`, `PosLoad`, `Angel` and `brake`. The brake switches on at `t=13.302, 29.472` and `56.752 sec`.

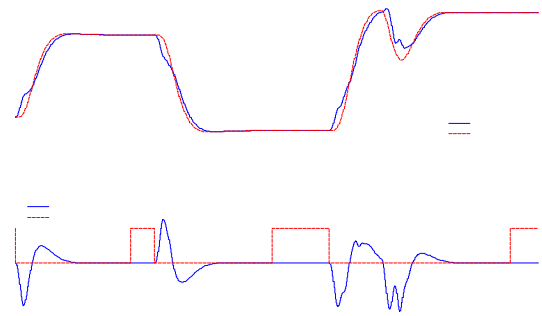

Figure 2: Crane with Controller

Task 3: Figure 3 shows the transient diagrams, the lower one gives the status of `Angle`, `Brake`, `EmergencyMode` and `EmergencyStop`. Diagnosis was implemented with an s-function that is called every millisecond. The status of the angle sensor (`valid=0`, `not valid=1`) is stored in a vector of length 100. With each call the content of the vector is shifted by one and the freed cell updated with the present status of the sensor. If the sum of ones in the vector is greater than 50 `EmergencyMode` is triggert.

The system switches to Emergency-Mode at `t=18.054` and continues the processing of jobs. Emergency Stop is triggered at `t=44.524`. The car stops and the load carries on moving like a pendulum.

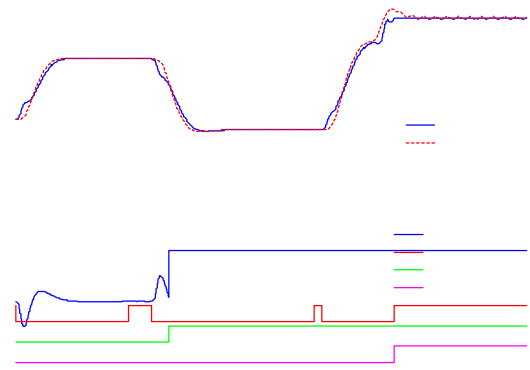

Figure 3: Emergency Mode and Emergency Stop

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C7 Constrained Pendulum – DYMOLA

Law-oriented Modelling

Simulator: DYMOLA – Dynamic Modeling Laboratory – provides a powerful object-oriented modeling and simulation environment with MODELICA support. The usual need for manual conversion of equations to a block diagram is removed by use of automatic formula manipulation, so that physical laws can be used for modelling. Before experiments are performed the code is compiled which speeds up simulation runs.

MODELICA, a quasi-standardized description for law-oriented modelling supports hierarchical structuring, reuse and evolution of large and complex models independent from the application domain and acausal modelling based on differential and algebraic equations. DYMOLA is able to understand MODELICA model notations.

Model: In this approach DYMOLA's equation layer, which is part of the model editor, has been used. To build the linear model even the graphical model editor could have been used, but for the non-linear model there exists no basic class so the equation layer is the easiest way to describe it. Because DYMOLA chooses state-variables on his own and is able to handle state-events automatically it is rather easy to describe the model. The code to declare parameters and variables has the following form:

```
parameter Real m=1.02,g=...
Real phi(start=pi/6),...
Real v,l,...
```

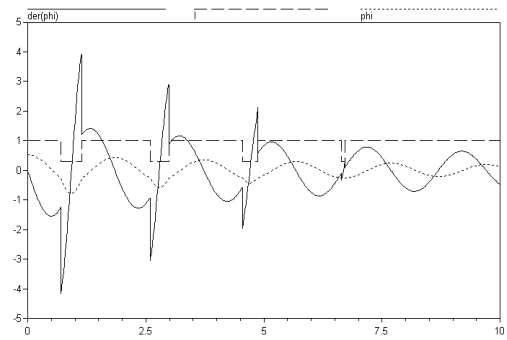
The code to describe the non-linear model:

```
l = if phi > phi_pin then l1 else l2;
v = l*der(phi);
m*der(v) + m*g*sin(phi) + d*l*der(phi) = 0;
```

Task a: Simulation of the System: After setting the initial values and specifying the simulation interval the simulation is started out of DYMOLA's main window. Because of DYMOLA's automatic state-event handling it is just necessary to specify initial conditions for the angle and the angular velocity (from where the initial pendulum length is determined by means of the the derived model equations).

Parameters are changed in the main window too, but for more complex parameter variations the MODELICA language with its experiment environment could be used.

The following plot shows the solution for $\varphi_0 = \pi/6$ and $d = 0.2$.

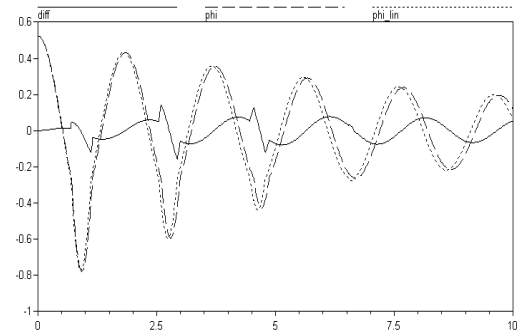


Task b: Linearization: The linearized model is implemented in the same way as the non-linear model, just substituting sin φ with φ. To compare the different results both models have to be simulated in parallel. DYMOSIM, DYMOLA's simulation environment, offers no tools to compare results from different simulation runs. The code to be added is:

```
l_lin = if phi_lin > phi_pin then l1 else l2;
v_lin = l_lin*der(phi_lin);
m*der(v_lin) + m*g*phi_lin +
d*l_lin*der(phi_lin) = 0;

diff=phi-phi_lin ;
```

The following plot shows the angle of the linear pendulum and the non-linear pendulum and the difference as a function of the simulation time.



Task c : Boundary Value Problem: This problem can be transformed to an initial value problem by integrating the equations backwards in time. The simulation run has to be stopped when the given start-value is reached, which may be easily implemented in DYMOLA because of its automatic state event handling.

The solution is the angular velocity at t = 0, which is approximately 2.1847.

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C11 SCARA Robot – MATLAB

Unsegmented Model /Environmental Level

Simulator: MATLAB is a widely used software tool based on numerical vector and matrix manipulation. For this solution "pure" MATLAB (without the graphical simulation blockset SIMULINK) was used.

Model: The model equations have to be programmed, in orderd sequence the right-hand side of the equations has to be provided for an ODE solver:

```
function dydt2 = f(t,y)
global m3l g kt Ra La u P D ......
T = (sqrt(3)/2)*u.*kt.*[y(7); y(8); y(9)]
% right side --------
dydt(1) = y(4); dydt(2) = y(5);
dydt(3) = y(6);
dydt(4) = T(1)+O(2)*(2*y(4)*y(5)+
          y(5)^2)*sin(y(2));
dydt(5) = T(2)-O(2)*y(4)^2*sin(y(2));
dydt(6) = T(3)-m3l*g;
```

Task a: Explicit and Implicit Modelling Techniques: The model was implemented in three various ways. First the implizit equation $M \cdot dy/dt = b(y,t)$ was implemented, as MATLAB's solvers allow implicit models of the type given, using options and providing the function $b(y,t)$ and the Mass matrix $M(y)$:

```
options = odeset('Mass','M(t,y)')
[t y] = ode15s('robotersys_im') ...
function varargout=robotersys_im(t,y,flag)
switch flag
case ''
   varargout{1} = f(t,y);
case 'mass'
   varargout{1} = mass(t,y);
case 'init'
   [varargout{1:3}] = init; end
function dydt2 = f(t,y) ...
function M = mass(t,y) ...
function [tspan,y0,options] = init ...
```

In the second approach the Gaussian algorithm was used to solve the linear equation $M(y) \cdot dy/dt = b(y,t)$ with respect to dy/dt in each integration step numerically.

This may take more time, but an explicit solver can be used, which could be faster then the implizit one necessary in the first approach.

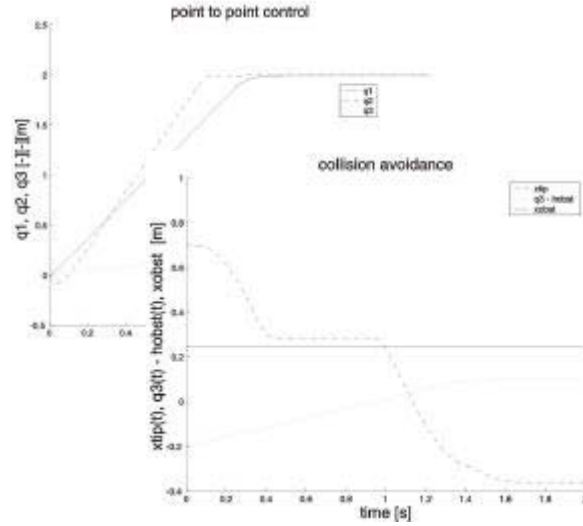
The third approach inverted the mass matrix symbolically. The explicit equation $dy/dt = M^{-1} \cdot b(y,t)$ can easily be solved by an explizit algorithm. The table compares the times for a 10 sec run (normalized):

Model / Algorithm	ode15s	ode23t	ode23tb
implicit	1.00	1.01	1.06
explicit / numerical	1.35	1.31	1.32
Explicit / symbolical	2.17	1.67	1.78

Task b: Pont-to-point control: The PD control was directly integrated in the function for the right side of the implizit implementation. In order to bound the voltage, a simple if assignment was used:

```
if y(6+i) > Imax(i) & dydt(6+i) > 0
dydt(6+i) = 0; end
```

So it was possible to get the current back from the limit without stopping the alorithm by using an event option (simulation results next fig.)



Task c: Collision avoidance: As at MATLAB level no event mechanism is available, for collison handling again voltage was also directly regulated in the function for the right side. In case of emergency, the PD control was used as if the final state was reached permanently, so that only the speed was regulated down. With an if assignment the emergency limits were realised (results see fig. above):

```
if (xtip-xobst) <= dcrit & y(3) < hobst
   U(1) = -D(1) * y(4);
   U(2) = -D(2) * y(5);
```

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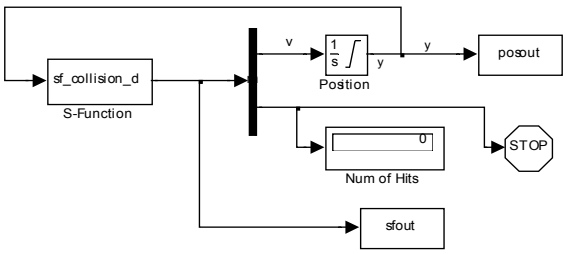
C12 Collision of Spheres – MATLAB / Simulink

Numerical Simulation / Event-oriented Model

Simulator: MATLAB is a widely used software tool based on numuerical vector and matrix manipulation. SIMULINK is a graphical extention for block oriented simulation. S-functions provide a mechanism for extending the capabilities of SIMULINK by adding own blocks. The functionality of these blocks is defined in m-code or C-like programming language.

Model: The main components of the SIMULINK model are the s-function that provides the velocities and times of collisions and an integrator that calculates the positions of the spheres (following pic.).



Since the zero-detection-block is not available in the presence of an s-function, integration was limited to `[0, inf)`. For the s-function an event-driven approach was chosen: using state- (current velocities) and input- (current distances) information the s-function calculates state update and the time when it should be called again (time of next collision).

```
function sys=mdlGetTimeOfNextVarHit(t,v,u,e)
global thit stop hittype
% get time of next collision
v_0=-eps;y_0=realmin;
thit = 0;
hittype = 0;
if (v(2) < v_0) & (u(2) > y_0)
    thit = - u(2) / v(2); hittype = 1;
end
if (v(3) < v_0) & (u(3) > y_0)
…
```

Task a: Figure 1 shows the distance-time function for $e=0.2$. For $e=1$ final velocities are $vx_1=vx_2=vx_3=0$ and $vx_4=1$.

The smallest e for which the model is computable is $e=0.154504$. (quasi-plastic case). Smaller values of e lead to times between two collisions that are smaller than Simulinks minimum timestep (~10^{-14}). In this dimension the collision-model is definitely not valid so no extensions have been made.

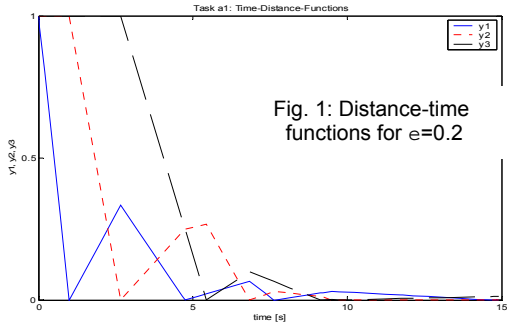


Fig. 1: Distance-time functions for $e=0.2$

Task b: Figures 2 shows the numbers of collisions and final velocities v_4 for simulation runs with e varied from 1 down to 0.154504.

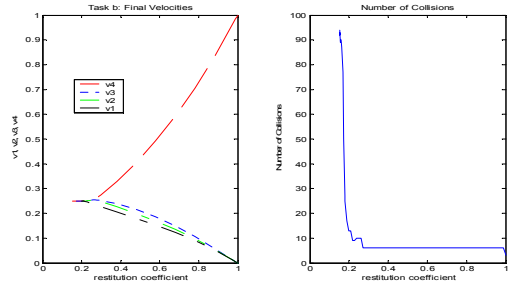


Figure 2: Final Velocities and Number of Hits

Task c: The boundary value problem was solved using the results of task b and cubic interpolation. To get $v_4=v_0/2$ the restitution coefficient has to be $e=0.587401$.

The statistic parameters obtained from 1000 samples are: mean value: $v_4=0.422762$ standard deviation: $s=0.0422665$ and 95% confidence interval: $[0.42014 \le \mu \le 0.42539]$

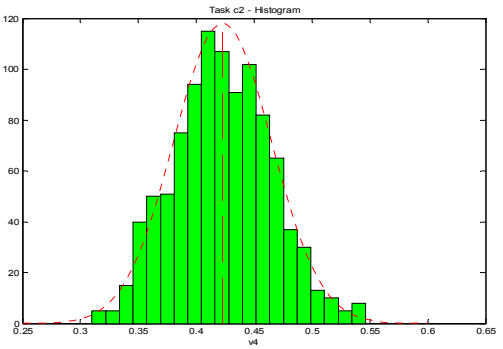


Fig.3: Histogram of final velocity v_4 for e out of N(0.5, 0.005)

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C12 Spheres' Collision – SLX /LEDA

Analytical Simulation / Event-oriented Model

Simulator: SLX (**S**imulation **L**anguage with e**X**tensibility) is a compact system for developing discrete event simulations. SLX is object-based, but not object-oriented. Most important characteristics of SLX are its layered architecture and a syntax similar to that of C.

Model: In order to deal with this problem by a discrete event simulator we determine both the time to the next interaction and the two spheres involved in this collision. Our algorithm uses the relative velocities of neighbouring spheres to find the minimum among all possible future interaction times. Based on that we identify the spheres to execute the next collision and determine their resulting velocities as initial conditions for the next iteration step.

```
for (j = 1; j <= N-1; j++)
if (dv[j] > 0.0) dt[j] = dx[j] / dv[j];
else dt[j] = 1e+10;
k = 1; dtmin = dt[k];
for (j = 2; j <= N-1; j++)
     if (dt[j] < dtmin)
     { dtmin = dt[j]; k = j; }
```

LEDA [1] (**L**ibrary of **E**fficient **D**ata types and **A**lgorithms) is a software library which introduces the algebraic *real* data type to C++. The *reals* are the best approximation of the mathematical real numbers $\mathbb{R}$. They offer exact results for the operators +, -, *, /, the *k*-th root for any natural number *k* and for the comparative operators ==, !=, <, >, ≤, ≥.

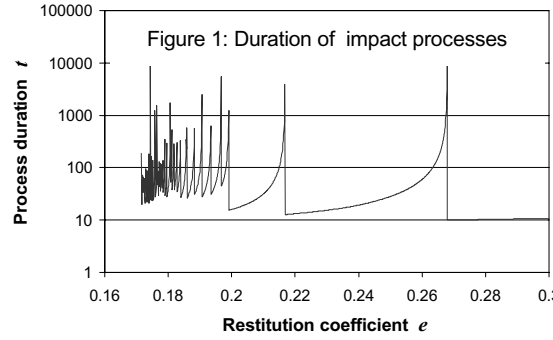
The *reals* "memorize" the calculations executed in an expression dag. Only if two *reals* are compared, or a number of the type *real* is to be output, the result is computed "as precise as necessary" in order to execute an exact comparison or in order to output the result with a given number of digits. This is however connected to a dramatically increasing runtime.

LEDA is coupled with SLX in order to increase the accuracy of the calculations essentially.

Task a: Modeling and simulating the impact pendulum by means of the simulation language SLX fully confirmed the results we already obtained using ACSL (polygon-type distance-time graph for $e = 0.18$, and final velocities $v_1 = v_2 = v_3 = 0$, $v_4 = 1$ (elastic case) and $v_1 = v_2 = v_3 = v_4 = 0.25$ (quasi-inelastic / plastic case)).

Additional examinations focus on the duration of the impact processes. The value of *e* also influences the duration of these which we define as the time up to reaching a state in which no further interactions will occur so that the terminal condition is met. A decrease in *e* shortens the duration of the process as long as this causes no additional interactions.

Additional interactions lead to a strong increase in the process duration. Fig. 1 shows this dependence.



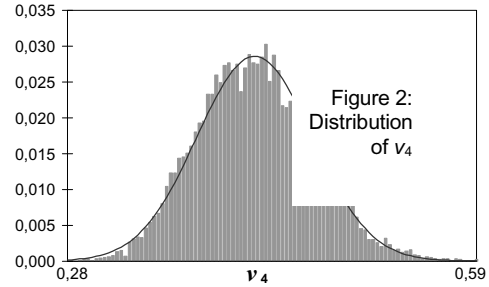
Task b1: Number of Collisions: With the use of the C++ library LEDA, it was possible to assure the numerically critical determination of the number of interactions *n* in the case of small restitution coefficients *e*. Some of the results are represented in Table 1.

e	0.1715735	0.1715730	0.1715729
n(*e*)	2947	6583	> 11216 *

Table 1: Number of interactions *n*(*e*)
(* after 2 months of comp. time, Sun Ultra 400MHz, 512 Mbyte RAM)

Results of **Task b2** and **Task c1** with SLX / LEDA are confirmed by former results e. g. with ACSL (Task b1: final velocities over *e*, and Task c1: $e = 0.587401052$ for boundary value problem $v_4 = v_0/2$).

Task c2: Distribution of v_4: With an again increased sample size of $n = 10000$ we obtain $m = 0.423192$, $s = 0.042100$, and CONF{$0.422367 \le \mu \le 0.424017$}.



References

[1] *K. Mehlhorn and S. Näher. LEDA: A Platform for Combinatorial and Geometric Computing. Cambridge University Press, Cambridge, UK, 1999.*

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C12 Sphere's Collision - FORTRAN

Algorithmic Simulation / Time-oriented Model

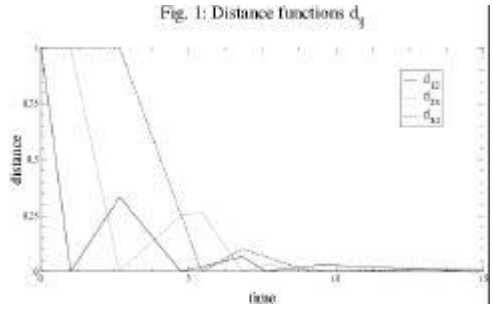
Simulator: FORTRAN is used for the numerical calculations. The code for the algorithm is not longer as in a simulator (which is not necessary) or in a simulator environment, the numerical effects of the code are better known, and the code is very fast. Graphics is done by postprocessing in MATLAB.

Model: A FORTRAN 90 program was used to (1) determine the next two spheres which will hit each other and (2) to update the positions and the velocities of the spheres after the collision according to the rules for partially elastic collisions. All calculations were carried out in double precision.

The program terminates if all relative velocities are not negative (no more collisions) or if the next two colliding spheres cannot be determined uniquely (two pairs of spheres are numerically equally likely to collide next). Assuming that the last pair of spheres to collide will not also be the next to collide, simplifies the algorithm. Additionally, only spheres with a negative relative velocity are considered:

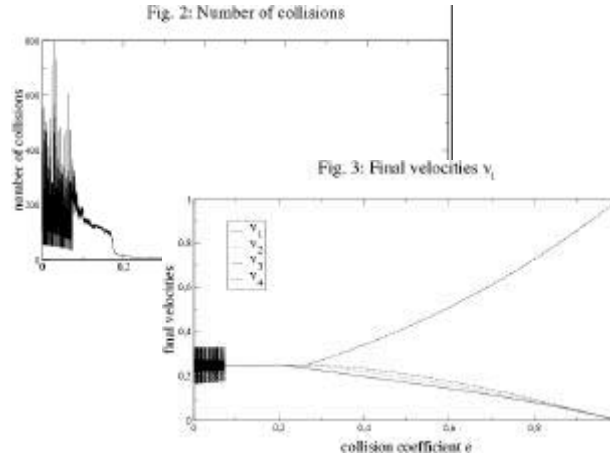
```
!  previous hit of spheres 1 and 2
IF (.NOT. t12_log) THEN
  IF ( (v23 .LT. 0) .AND. (v34 .LT. 0) ) THEN
    IF (d23/v23 .EQ. d34/v34) THEN
      EXIT
    END IF
    t_neg_max = max( d23/v23 , d34/v34 )
    IF (t_neg_max .EQ. d23/v23) THEN
      nexthit = 23
    ELSE IF (t_neg_max .EQ. d34/v34) THEN
      nexthit = 34
    END IF
  ELSE IF ( v23 .LT. 0 ) THEN
    nexthit = 23
  ELSE IF ( v34 .LT. 0 ) THEN
    nexthit = 34  ……..
```

Task a: Simulation in time domain / Final velocities: The final velocities in task a2 for e = 1 are $v_1 = v_2 = v_3 = 0$ and $v_4 = 1$. The lowest e-value which permits the program to exit the loop (all relative velocities ≥ 0) was 0.0811, with $v_i = 0.25000000$.



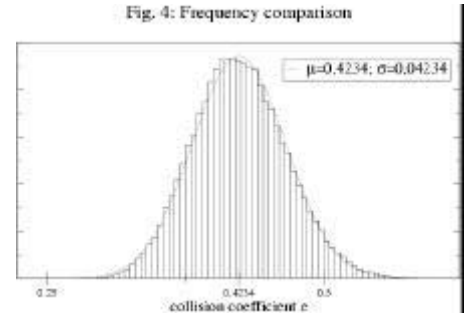
Task b) Variation of restitution coefficient: The stepsize for the variation of e was 0.0001; Fig. 2 shows the number of collisions over e and Fig. 3 the final velocities of the spheres.

Since these figures also contain the final values for those simulations where the calculation were stopped because of numerical problems, the number of collisions in Fig. 2 should be considered as lower bounds. Additionally, for the reliable simulations (no more collisions) the final velocities of all spheres for e-values < 0.1770 are 0.25000000 practically.



Task c: Boundary value problem / Statistical deviation of restitution coefficient. The boundary value problem was solved by bisection: $v_0 = v_4/2$ holds practically, if e = 0.5874010519682.

For task c2 the **R**-function rnorm was used to generate a set of 100000 random deviates. These e-values were used to calculate the distribution of the final value of v_4 (see Fig. 4). The statistical parameters are: $\mu_4 = 0.4234$, s = 0.04234, 95 % conf. interval: [0.4231687,0.4236936]



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Das neue Release 4.0

OPNET

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Ein völlig neuartiges Softwarepaket, das die Technologie der Co-Simulation nutzt, um Schaltungsentwürfe im Zusammenhang mit Netzwerken oder verteilten Systemen zu überprüfen.

Die Fähigkeit von OPNET, Netzwerke exakt zu simulieren, erlaubt den Hardwareentwicklern, realitätsnahes Netzwerk-Verkehrsaufkommen und Protokolle als Stimulus ihrer Schaltungsmodelle einzusetzen. Das Ergebnis ist eine schnellere, präzisere und leistungsfähigere Testumgebung für Schaltungsentwürfe in VHDL und VERILOG. Integriert mit ModelSim von Mentor Graphics.

Software mit Zukunft

scientific COMPUTERS

Scientific Computers GmbH
Franzstr. 107-109, 52064 Aachen,
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eMail: opnet@scientific.de, Web: www.scientific.de

MIL 3
Modeling Technologies for the Third Millennium

CONFERENCE REPORTS

Winter Simulation Conference WSC 2000

From December 10-13, 2000, we held the thirty-third Winter Simulation Conference. The conference was in sunny Orlando, Florida at the Wyndham Palace Resort and Spa, across from expansive Downtown Disney.

We drew a record number of 712 paid registrants and 14 full technical tracks. WSC brought together academics, practitioners, and vendors in simulation and related fields. The scope of the WSC encompasses all aspects of discrete-event simulation, combined discrete-continuous simulation, and gaming.

The conference itself is sponsored by a group of eight professional organizations. A member from each of the sponsoring organizations serves on the WSC Board of Directors whose function is to assure that the conference runs smoothly from year to year. The conference would not have happened if not for the strong volunteer team that drove it forward: Keebom Kang (Program), Brad Armstrong (Business), Jeffrey Joines and Russ Barton (Proceedings), Dave Ferrin (Sponsorship), Ann Dunkin (Exhibits), Mark Grabau (Registration), Rich Kilgore (Publicity), Manuel Rossetti (Publications), Connie and Graham Nott (KidSim), Roger Smith (SimMedia), and Martha Fishwick (Family). We thank Jim Wilson for his help with the Proceedings and other matters. There were a large number of key Track Coordinators, under Keebom Kang's direction, who managed significant pieces of the technical tracks. All of these volunteers on the WSC00 conference team performed critical time-consuming tasks.

The conference is grateful to an increasing number of sponsors from year to year. In particular, Accenture (formerly Andersen Consulting) lead the sponsorship at the Gold Level, and Promodel at the Silver Level. Accenture sponsored the Monday night reception and Promodel, the conference bags. AutoSimulations, Threadtec, Hewlett-Packard, and Rockwell Software also sponsored significant items. Bob Sargent kicked off the technical part of the preconference Ph.D. Student Colloquium with his keynote address.

The conference keynote was given first thing Monday morning by Richard Kidd, who spoke on "The Changing Face of Entertainment and the Driving Force Behind It: Computer Simulation." Kidd is a freelance visual effects consultant and has worked on box-office blockbusters such as *Titanic* and *What Lies Beneath* during his positions at Cinesite and Sony Entertainment.

On a sadder note, we mourned the passing of Alan Pritsker with his lifetime effort in simulation. There were several awards presented: Prof. Dr. Felix Breitenecker was awarded the INFORMS Distinguished Service Award; James Propp and David Wilson garnered the INFORMS Outstanding Publication Award, and Paul Fishwick was given the SCS Outstanding Service Award. Matt Rohrer told us great things to expect for next year's conference with its "2001: A Simulation Odyssey" theme.

The Conference also included three new events: KidSim, SimMedia, and Internet Café. All three of these events had a great response. KidSim's purpose was to introduce kids into the area of simulation through graphically and audio-enriching games such as The Sims, Sim City 3000 and StageCast Software. A significant number of adults (including moi) were to be found lurking in the KidSim area!). SimMedia ran for two consecutive nights, with a taped-session of video snippets from many industrial and military sources. Each night drew from between 60 and 80 people. Soft drinks and popcorn were served. The Internet Café had 12 Internet workstations donated by Hewlett-Packard for the express purpose of allowing attendees to check their emails and surf the web. For the first time, conference memorabilia were sold, including hats, coffee mugs, t-shirts and polo-shirts.

A family learns simulation in the WSC00 KidSim area

Please consider getting involved in WSC01. As usual, you can go to the conference web site http://www.wintersim.org at any time to find out the state of the conference. See you next year!

Paul Fishwick (General Chair WSC'00)
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BOOK REVIEWS

Deterministic Scheduling Theory

R. Gary Parker, 1995 Chapman & Hall,
ISBN 0-412-99681-2, 290 p.

Der Autor behandelt das Thema "Scheduling Theory" sehr gründlich und schafft es, eine tiefgehende Darstellung mit vielen Beispielen mit einem Überblick zu verbinden, sodass der Leser durch das Material geführt wird, ohne die Orientierung zu verlieren. Gerade das klare Herausstreichen von Zusammenhängen hilft auch Neulingen auf diesem Gebiet sehr beim Verständnis der Materie.

The author deals with scheduling theory very thouroughly, managing both to cover the topic in depth with many clever examples and to provide a very good overview to lead his readers through the material so they can keep track of what they are reading and do not get lost in all the knowledge.

It is a very good book for beginners who want to get an overview about what they are going to study (and are willing to just skip pages which they cannot possibly yet understand). But is might be even more useful for graduates who still know something about the topic but now - suddenly and unexpectedly - have to apply what is supposed to be known to them. They will quickly recognize the theorems they once struggled to memorize but now thanks to lots of examples they will gain new insights concerning the connections between them.

Of course this book cannot cover everything ever published about scheduling theory. There are two clear omissions in this work: stochastic scheduling results and the explicit treatment of "practical" scheduling models or applications. But while these omissions are not inadvertent they are most certainly not intended to be provocative either. The author simply claims to stick to areas where he is sure to be an expert by studies and experience.

Beginner	Intermediate	Expert
	●	
Theory	**Mixed**	**Practice**
	● ●	
Lecture Note	**Monograph**	**Proceedings**
	● ●	

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Foundations of Fluid Mechanics with Applications

S. Kiselev, E. Vorozhtsov, V. Fomin
Birkhäuser 1999
ISBN 0-8176-3995-0

Fluid mechanics is a branch if science dealing with the study of continua under the action of external forces. It has a rich history and nearly unchanging core of material but is constantly expanding and evolving as new methods, applications, and computational tools are developed.

This new text/reference presents the basic concepts and methods of fluid mechanics, including Lagrangian and Eulerian descriptions, tensors of stresses and strains, continuity, momentum, energy, thermodynamics laws, and similarity theory. The models and their solutions are presented within a new context of the mechanics of multiphase media. The treatment fully utilises the computer algebra software system called *Mathematica* to both develop concepts and help the reader to master modern methods of solving problems in fluid mechanics.

Topics and features:

- Glossary of over thirty Mathematica computer programs
- Extensive, self-contained appendix of Mathematica functions and their use
- Chapter coverage of mechanics of multiphase heterogeneous media
- Detailed coverage of theory of shock waves in gas dynamics
- Thorough discussion of aerohydrodynamics of ideal and viscous fluids and gases
- Complete worked examples with detailed solutions
- Problem-solving approach

Foundations of Fluid Mechanics with Applications is a complete and accessible text/reference for graduates and professionals in mechanics, applied mathematics, physical sciences, material science, and engineering. It is an resource for the study and use of modern methods for problems in fluid mechanics and the underlying mathematical models.

Beginner	Intermediate	Expert
	●	
Theory	**Mixed**	**Practice**
	●	
Lecture Note	**Monograph**	**Proceedings**
	●	

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Fractal Geometry and Number

Complex Dimensions of Fractal Strings and Zeros of Zeta Functions
Michel L. Lapidus / Machiel von Frankenhuysen
Birkenhäuser, Boston, 1999, ISBN 3-7643-4098-3, 280 p. Hardcover, sFr. 98,-/ DM 118,- / öS 862,-

Number theory and fractal geometry are combined in this study of the vibrations of fractal strings, that is, one-dimensional drums with fractal boundary, and of the zeros of zeta functions. The notion of complex dimension, hinted at in an earlier work on fractal and spectral geometry which examined connections with the Riemann zeta functions, is precisely defined in this work.

An explicit formular originally developed for the proof of the Prime Number Theorem, is extended here to apply to the zeta functions associated with fractals.

This theory of complex dimensions enables a precise description of the oscillations in the geometry or in the spectrum of a fractal string.

In the context of vibrating fractal strings, the Riemann Hypothesis is given a geometric setting. This conjeture becomes an inverse spectral problem, and its interpretation in the language of fractal strings, which have complex dimensions with real part between 0 and 1, is: “One can {\it hear} if a fractal string is Minkowski measurable, provided that is fractal dimension is not 1\2.” This is of course an allusion to a central problem in contemporary mathematics, often expressed as “Can one hear to shape of a drum?”

A combination of analytical and geometric methods is used to also establish new results about the vertical distribution of zeros of number-theoretic and many other zeta functions.

The new approach and results on the important problems illuminated in this work will appeal to researchers and graduate students in number theory, fractal geometry, dynamical systems, spectral geometry, and mathematical physics.

Beginner	Intermediate	Expert
		●
Theory	**Mixed**	**Practice**
●		
Lecture Note	**Monograph**	**Proceedings**
	●	

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A Beginner’s Guide to Graph Theory

W. D. Wallis, Birkhäuser, Boston, 2000
ISBN 0-8176-4176-9, xviii + 230 pages
Hardcover, DM 78.- / ATS 570.- / sFr. 68.-

When we study sciences like mathematics, database theory, management science we meet applications of graph theory. Due to the fact that the users of these sciences are widely spread, there is great need of a book which deals with a pure introduction on graph theory.

The book is organized in 13 chapters. The first four of them introduce the basic elements and concepts. Classical problems are explained i.e. euler walks, the travelling salesman problem.

Chapters for readers of special interest are also included. So chapter 6 discusses a special topic, the one-factorization of graphs. If the reader only has interest in an overview, these chapters can be omitted without any loss of basic information.

Advanced topics are discussed in the following chapters like coloring and planarity. It is recommended having studied the preceeding chapters quite carefully; the author calls some of these topics „quite difficult“.

Graph theoretic algorithms are presented in the last chapter of the book. Computer scientists will be interested in implementing these algorithms; the understanding of graphs is enormously improved, when „visualization“ is implemented based on the algorithms. Each of these chapters ends with a set of exercises. For the „self studying“ reader is recommended to solve these exercises to improve the knowledge on the theory. It is very useful that the solutions of these exercises are collected in an appendix.

Alltogether the book gives a comprehensive introduction to graphs, their theory and their application. The reader should study each chapter carefully. The use of the text is optimized when the exercises are solved. The optained skills improve unterstanding of graph theory well.

Beginner	Intermediate	Expert
●	●	
Theory	**Mixed**	**Practice**
●	●	
Lecture Note	**Monograph**	**Proceedings**
	●	

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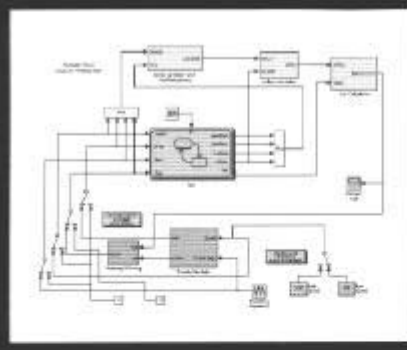

Das Bild oben zeigt ein Modell für eine Einspritzanlage in Simulink und stellt die Möglichkeit dar, ereignisorientierte Blöcke aus Stateflow mit dynamischen Blöcken in einem Modell zu verbinden.
Mit dem Real-Time Workshop und dem Stateflow Coder kann aus einem solchen Modell automatisch ANSIC-Code generiert werden. Durch die offene Architektur des Real-Time Workshop ist es möglich, diesen Code auf unterschiedlichster Echtzeit-Zielhardware (DSP-Boards, Microcontroller etc.) zu implementieren.

MATLAB 5
Besuchen Sie uns im Internet:
www.scientific.de

ECHTZEIT PER MAUS-KLICK!

Simulink-Modelle für Echtzeitimplementierungen in C-Code übersetzen.

Echtzeit- und Stand-alone- Simulation.

Mit dem vom Real-Time Workshop erzeugten Code können sowohl Stand-alone Simulationen mit maximaler Geschwindigkeit als auch Hardware-in-the-Loop-Simulationen im Echtzeitbetrieb durchgeführt werden.

Rapid Prototyping.

Die automatische Codegenerierung und Automatisierung von Kompilieren, Linken und Laden gibt Ihnen eine sehr schnelle und effiziente Möglichkeit, den grafisch entwickelten Algorithmus direkt in Verbindung mit der Zielhardware zu testen und zu optimieren.

Unterschiedliche Zielhardware.

Der Real-Time Workshop ermöglicht durch seine offene Architektur Echtzeitimplementierungen auf unterschiedlichsten Zielplattformen, vom Microcontroller über PCs bis hin zu verschiedenen DSP-Boards.
Die Besonderheit für die Microcontrollerimplementierungen ist die Generierung eines rein integerbasierten C-Codes mit dem CONTI-Tool, ohne daß sich der Benutzer mit Skalierungen und Wertebereich-einschränkungen befassen muß.

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Tel.: 0241-470950, Fax: 0241-44983, E-mail: matlab.info@scientific.de
München: Münchner Str. 34, 85774 Unterföhring, Tel.: 089-9959013, Fax: 089-99580111

Schweiz: Scientific Computers SC AG
Schärmattstrasse 6 + 8, CH - 3073 Gümligen,
Tel.: 031 954 20 20, Fax: 031 954 20 22 , E-mail: info@scientific.ch

Interactive Operations Research with MAPLE

Methods and Models
Mahmut Parlar, Birkhäuser 2000,
ISBN 0-8176-4165-3, 488 pages, Hardcover,
DM 128.- / öS 935.- / sFr. 108,-

This book provides an important link between MAPLE and its successful use in solving problems on Operations Research (OR). The numerical and graphical aspects of MAPLE make this software package an ideal tool for treating certain OR problems and providing descriptive and optimization-based analyses of deterministic and stochastic models.

Detailed is MAPLE´s treatment of some of the mathematical techniques used in OR modeling: e.g., algebra and calculus, ordinary and partial differential equations, linear algebra, transform methods and probability theory. A number of examples of OR techniques are presented, such as linear and nonlinear programming, dynamic programming and optimal control, and stochastic processes.

Almost every MAPLE statement used in the solution of a problem is clearly explained. At the same time, technical background material is presented in a mathematical manner to reach the OR novice and professional. All MAPLE-worksheets are downloadable from the author´s website at

www.business.mcmaster.ca/msis/profs/parlar,

or form the Birkhäuser site.

This book is intended for graduate students in operations research, management science departments of business schools, industrial and systems engineering, economics and mathematics. Researchers and practitioners would be able to use the MAPLE package to solve realistic OR problems.

Beginner	Intermediate	Expert
●	● ●	
Theory	**Mixed**	**Practice**
	●	●
Lecture Note	**Monograph**	**Proceedings**
	●	

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An Introduction to the Mecanics of Fluids

C. Truesdell, K.R. Rajagopal,
Birkhäuser Verlag Boston, Basel, Berlin, 2000
ISBN 0-8176-4014-2

Although the title promises an introduction to the mecanics of fluids, it provides a compact and moderately gerenal foundation of the mechanics of continua. The applications for the presented theory come from the field of fluid mechanics and deals mostly with classical fluids named after Euler, Navier and Stokes. After this build up of basic concepts the authors now specializes to the mecanics of fluids and discusses for example Navier-Stokes Fluids, incompressible and compressible Euler Fluids, visometric flows, nonlinear fluids in general. Each chapter has integrated exercises, and numerous detailed, worked examples and results.

To use this book efficiently the reader should be fimilar with the basic concepts of Analysis. Although the Appendix summarizes all Analysis concepts needed one has to be fimilar with this facts. If yes, this book gives more than an introduction but all in an abstract mathematical way. If one expects technical or pysical examples and their numerical solution he will be dissapointed. No numerics and approximate theories are denigrated. In the preface the authors pointed out that in this book no numerical work should be included but literature is given to this topics.

All applied mathematicians, mechanical engineers, aerospace engineers and engineering mechanics graduates and researchers will find the book an essential reading resource for fluids. It is also suitable as a self-study/reference guide. But all is done in a mathematical exact way without practical examples and numerical calculations. Some of the readers who are not fimilar with fluid mecanics and want to have an introduction may find this book hold too general for the first contact with fluid dynamics. A good knowledge on mechanics helps the reader to understand the mathematical concepts in this book an is then a good and exact introduction.Paragraph text uses format body standard No further line between paragraphs needed.

Beginner	Intermediate	Expert
●	●	
Theory	**Mixed**	**Practice**
	●	
Lecture Note	**Monograph**	**Proceedings**
●	●	

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Mathematical Visualization

Algorithms, Applications and Numerics Hans – Christian Hege Konrad Polthier, Springer Berlin, 1998, ISBN: 3–540–63991–8; 391 pages, öS 1226

This book is the second in a series of collected research articles on Mathematical Visualization (compare above: Visualization and Mathematics / Experiments, Simulation and Environments, Springer Berlin, 1997). Hence, what was said above is valid for the most part of this book as well.

Articles in this book were collected after a recent workshop in Berlin held in 1997. Research material treated in the articles can be attributed to the following topics: Meshes, Multilinear Approximation and Visualization, Geometry and Numerics, Graphics Algorithms and Implementations, Geometric Visualization Techniques and Vector Fields and Flow Visualization.

Beginner	Intermediate	Expert
	●	●
Theory	**Mixed**	**Practice**
	● ●	
Lecture Note	**Monograph**	**Proceedings**
		●

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Modeling in Applied Sciences

A Kinetic Theory Approach
Bellomo, N. / Pulvirenti M. ,Birkhäuser 2000, ISBN 0-8176-4102-5, 440 pages, Hardcover, DM 168.- / öS 1227.- / sFr 138.-

Modeling complex biological, chemical and physical systems, in the context of spatially heterogeneous mediums, is a challenging task for scientists and engineers using traditional methods of analysis.

Modeling in Applied Sciences is a comprehensive survey of modeling large systems using kinetic equations, in particular the Boltzmann equation and its generalizations. An interdisciplinary group of authorities carefully develop the foundations of kinetic models and discuss the connections and interactions between model theories, qualitative and comput-ationsal analysis and real world applications. This book provides an overview of the different aspects, models, computations and methodology for the kinetic-theory modeling process.

The topics of the book are:

- *Integrated modeling perspective utilized in all chapters*
- *Fluid dynamics of reacting gases*
- *Self-contained introduction to kinetic models*
- *Becker-Doring equations*
- *Nonlinear kinetic models with chemical reactions*
- *Kinetic traffic-flow models*
- *Models of granular media*
- *Large communication networks*
- *Thorough discussion of numerical simulations of the Boltzmann equation*

This book is an resource for all scientists and engineers who use large-scale computations for studying the dynamics of complex systems of fluids an d particles. Professionals, researchers and post-graduates will find in the book a modern guide to the topic.

Beginner	Intermediate	Expert
	● ●	●
Theory	**Mixed**	**Practice**
●	●	
Lecture Note	**Monograph**	**Proceedings**
	● ●	

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Advances in Soft Computing - Introduction into Neuro-Fuzzy Systems.

Robert Fuller
ISBN 3-7908-1256-0 Physica-Verlag Heidelberg-New York

The book in consideration contains introductory material to neuro-fuzzy systems. Originated from a respective course it's desired to be a novices' companion in terms of a textbook. Divided into four parts the author tries to provide a guide for the relevant topics.

Part one presents classical Fuzzy Logic to the reader. The description is brief but adequate. In an application oriented way all necessities of Fuzzy Logic are presented and discussed in varying detail but always in common speech. An applied example puts it all together and closes a pleasing Fuzzy Chapter.

Part two treats Neural Networks in a short and a bit superficially way. The most popular methods and techniques in neural networks became introduced but only in few sentence. This chapter may be used as an reference for further publications.

Part three combines now combines Fuzzy and Neural Nets in Neuro-Fuzzy Systems. Several approaches are presented in an attentive matter to the reader. Later these knowledge is used in chapter 4 to solve an real world problem.

Overall the book provides sound methods and guidelines to get deeper insight in Neuro-Fuzzy Systems and their application. In my opinion the book is absolute suitable as basic textbook for a relevant class.

Beginner	Intermediate	Expert
●		
Theory	**Mixed**	**Practice**
	●	
Encyclopedia	**Monograph**	**Proceedings**
●		

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Modelling, Simulation and Artificial Intelligence (in German)

Modellierung, Simulation und künstliche Intelligenz

Helena Szczerbicka, Thomas Uthmann (Eds.), SCS Publishing House, Erlangen Ghent, 2000 ISBN 1-56555-128-1, xii + 471 pages

This book presents the state of the art of artificial intelligence (AI) and simulation. An overview is given on modelling concepts, virtual environments, meta models, quality modelling, optimisation, new paradigms in simulation and intelligent data analysis.

Several articles deal with each topic. A detailed list of references is given for each set of reports. Engineers who look for an introduction to AI and simulation will benefit from this book.

A detailed review can be found in ASIM-Nachrichten 1/2001, April 2001.

Beginner	Intermediate	Expert
	●	●
Theory	**Mixed**	**Practice**
●	●	
Lecture Note	**Monograph**	**Proceedings**
		●

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Object-Oriented Programming The CLOS Perspective

Andreas Paepcke (ed.), 1993 Massachusetts Institute of Technology, ISBN 0-262-16136-2, 352 p.

This book is directed at the reader interested in object-oriented programming as a design technique.

It does so by examining one object-oriented programming language - CLOS (Common Lisp Object System) - from different angles, providing a cross-section that enables the reader to understand the thoughts behind the language, its intended use, its impact on object-oriented design and programming, and its place in the context of other object-oriented languages.

However, readers who are completely new to the concept of object-oriented programming will have difficulties with this book. Those who have already heard about this technique and look for a deeper understanding and also those who are interested enough to use additional literature will find it very useful and interesting.

The material is structured into five parts. First the language is introduced in just enough detail that the remaining material can be understood by readers unfamiliar with CLOS.

Part II addresses a very special aspect of CLOS, the Metaobject Protocol.

Part III compares CLOS with other object-oriented languages like C++, Smalltalk, Eiffel, and Sather. It points out advantages and disadvantages as well as helps distinguish between what really makes a language object-oriented and what is a mere speciality of a certain language.

Part IV presents contributions describing example implementations of CLOS by users. Emphasis is placed on explaining how the more unusual features of CLOS have been used to solve problems.

Part V finally describes techniques that have been used to implement CLOS on both specialized Lisp machines and on general-purpose hardware.

This book is intended - and may well be considered to succeed therein - to provide thought-provoking reading to anyone interested in the development of object-oriented programming, independent of one's linguistic allegiances.

Beginner	Intermediate	Expert
●	●	
Theory	**Mixed**	**Practice**
	●	●
Lecture Note	**Monograph**	**Proceedings**
	● ●	

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Classical and Spatial Stochastic Processes

R. B. Schinazi, Birkhäuser 1999
ISBN 0-8176-4081-9

This book is intended as a text for a first course in stochastic processes at the upper undergraduate or graduate levels, assuming only that the reader has had a calculus course and a first course in probability, not necessary including measure theory. In guiding the student from some simple classical models to some of the spatial models, the text is aimed at a broad audience of students not only in mathematics but also in biology, engineering and physics.

The first two chapters deal with discrete Markov chains and their stationary distribution, developing concepts like recurrence and transience, random walks, birth and death chains, ruin problem and branching process. These classical topics are treated with a modern twist: in particular, the coupling technique is introduced in the first chapter and is used throughout. The third chapter deals with continuos Markov chains and concepts like Poisson process, queues, birth and death chains and stationary distributions. The second half of the book treats spatial processes. The author picked several interesting models, like percolation, cellular automata, branching random walks and contact process on a tree but concentrated on those properties that can be analysed using elementary methods. These methods include contour arguments (for percolation and cellular automata) and coupling techniques (for branching random walks and the contact process). Examples, illustrations, problems and the appendix where one finds some basic facts about probabilities on countable spaces complete the book.

To sum up this book can be recommended as a text for a course in stochastic processes, not only dealing with classical but also introducing into spatial stochastic processes, what distinguishes it from most of the other introductions to stochastic processes.

Beginner	Intermediate	Expert
	●	
Theory	**Mixed**	**Practice**
	●	
Lecture Note	**Monograph**	**Proceedings**
	●	

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Visualization and Mathematics

Experiments, Simulations and Environments
Hans – Christian Hege, Konrad Polthier
Springer Berlin, 1997, ISBN: 3–540–61269–6;
368 pages, öS 1007

This book offers a collection of research articles to the reader. These articles were written on the occasion of an international workshop – Visualization and Mathematics – which took place in Berlin in 1995. The principal objective of this workshop was to get together mathematicians and computer graphic experts in order to discuss new developments.

The articles cover numerous possible applications of visualization and allow the reader to gain an insight into the principles and concepts related to this topic.

Sections of this book contain topics on Visualising Mathematics, Geometric Algorithms and Experiments, Visualization Algorithms and Data Structures, Visualization Environments and Visualization and Simulation Techniques.

The articles are well organised; they give a brief overview before approaching to the problems in detail. Numerous figures and graphics (partly in colour) illustrate important facts, and a detailed bibliography at the end of each article allows the reader to access supplementary information on a specific topic in an easy way.

Beginner	Intermediate	Expert
	●	●
Theory	**Mixed**	**Practice**
	● ●	
Lecture Note	**Monograph**	**Proceedings**
		●

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JOURNAL NEWS

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EUROSIM scientific journal Simulation and Modelling Practice and Theory (SIMPRA) is EUROSIM's scientific journal, published by Elsevier Science B.V.

It publishes high quality contributions on modelling and simulation. Instructions to authors and other information can be found on the journal's on

http://www.elsevier.nl/locate/simpra

Forthcoming papers - February, 2001

- Simulation of a road vehicle natural environment in a climatic wind tunnel.
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- Getting Demos models right, Part 1: practice, Part 2: theory.
  G. Birtwistle, Ch. Tofts,
- Discrete-event simulation: an inquiry into user practice.
  B.W. Hollocks
- Increasing efficiency in the simulation of a dynamic system of objects in 3D space
  E.P. Paulo, L.C. Malone,
- Qualitative system identification with the use of on-line genetic algorithms
  C.H. Lo, K.M. Chow, Y.K. Wang, A.B. Rad
- Midex-signal modelling with AleC++; specific features of the HDL
  V. Litovski, D. Maksimovic, Z. Mrcarica,
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- Performance analysis of automatic lookahead generation by control flow graph: some experiments
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System Dynamics Review is the journal of the System Dynamics Society (ww), published by by John Wiley & Sons, Ltd., Online ISSN: 1099-1727 Print ISSN: 0883-7066

Contents Volume 16, Issue 3 and 4, 2000

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IJS^{3}T - International Journal of SIMULATION: Systems, Science & Technology

UKSIM, the United Kingdom Simulation Society, has started an International Journal: IJS^{3}T, printed at nottingham Trent University. ISSN: 1473-8031 Print,

IJS^{3}T International Journal of Simulation: Systems, Science & Technology

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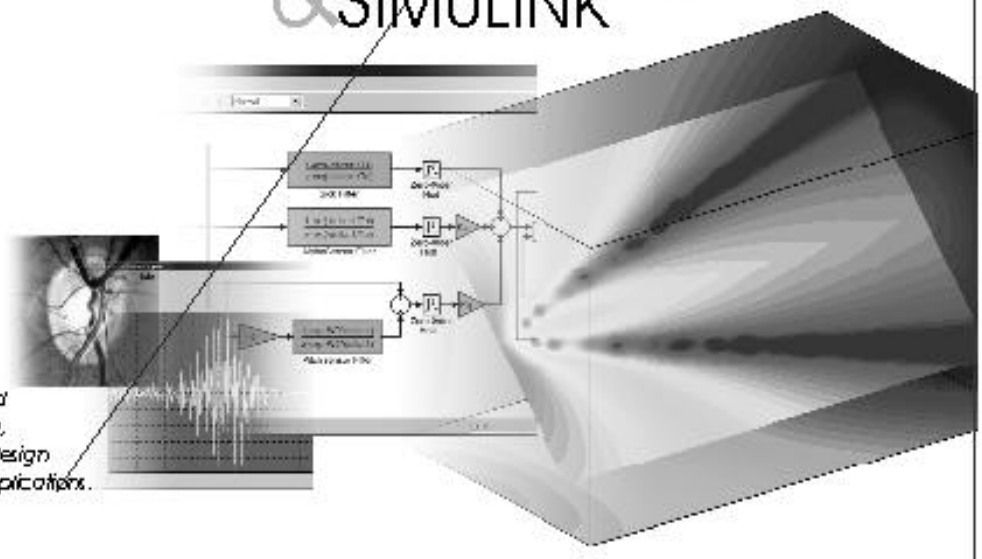

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