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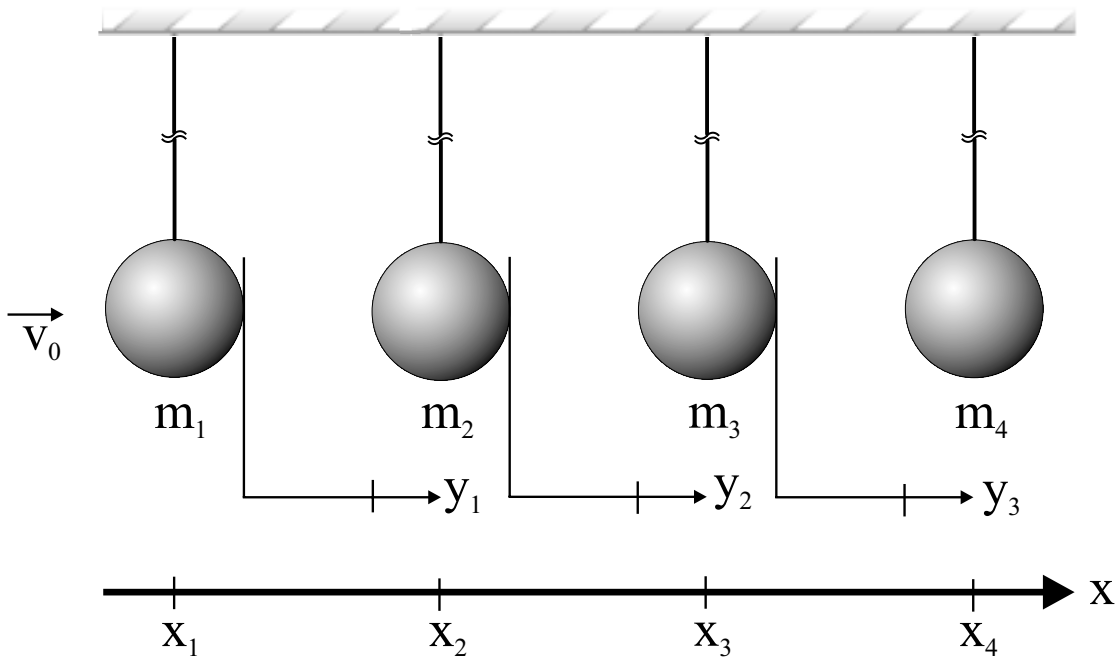

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Contents

Editorial

We are happy that we can continue to provide information on new developments in simulation techniques with two technical notes (essays), a comment on fuzzy systems by Zadeh, and with a new comparison.

The technical papers on VHDL-AMS – from two different viewpoints – underline the importance of this new development towards a standardisation in modelling and simulation of mixed systems or hybrid systems, resp. The note on "Fuzzy Sets and Fuzzy Logic: Discovery and Controversy" by Zadeh gives a very interesting insight into the deeper understanding what fuzzy really means – or should mean.

Based on a co-operation with Mr. Hohmann, Univ. Magdeburg, we continue our series of comparisons with a new one, C12 "Collision Processes in Rows of Spheres". This comparison is a "discrete"as well as a "continuous" one, it can be solved by continuous simulators, by discrete simulators, by Computer Numerical Systems, and by Computer Algebra systems. The equations look simple, but the events are very complex. The title page refers to this comparison, showing the mechanical layout of the system.

Furthermore, we would like to draw our readers' attention to the next EUROSIM congress (June 27-30, 2001, in Delft, The Netherlands), where the first full announcement can be found in this issue.

We thank all authors for their contributions, feedback, and support.

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VHDL-AMS
a normed Modeling Language for multi-domain Systems

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Abstract

VHDL-AMS is an IEEE standardized hardware description language for discrete, continuous and mixed systems. The language allows the modeling of multi-domain systems in a single language.

This paper shows the possibilities of VHDL-AMS with examples and supports a list of vendors who supply VHDL-AMS tools.

Introduction

VHDL-AMS (IEEE 1076.1) means "**V**ery High Speed Integrated Circuit **H**ardware **D**escription **L**anguage for **A**nalogue and **M**ixed **S**ignals". The language was approved by the Review Committee of the IEEE Standards Board IEEE Std 1076.1-1999, on March 1999 [1], [2], [3].

VHDL (IEEE 1076) is widely used to describe digital circuits. The superset of VHDL with the extension AMS (VHDL 1076.1) supports the modeling of discrete, continuous and mixed systems.

In addition VHDL-AMS allows the modeling of different natures, such as electrical, mechanical, thermal, hydraulical, optical, biological, economical, control etc. [4]. Multi-domain systems can be simulated and optimized in total. Through this, the better solution will often be found.

What does VHDL-AMS offer to the user?

VHDL-AMS defines a standardized modeling language and not the technology of the simulator. Models can be simulated with tools from different manufacturers running on different platforms. The user is independent of any tool. This delivers long term benefits to the user. Due to this the language is suitable as software intermediate code between developers, manufacturers and vendor products.

Developed model libraries can be made available to a wide range of users. Today VHDL is established as a standard in the digital world. A lot of libraries (e.g. IC's, processor cores, ...) can be obtained. Macro models can be written or adopted to build up more sophisticated models.

VHDL-AMS offers hierarchical top-down modeling technology. The model or submodel can be described behavioral. The advantage of this is a reduced simulation time and a simplified readable description. Because of the high level character of the language "simulationable specification" and documentation of a project can be written in VHDL-AMS.

Different versions of models or submodels behavior are supplied. Therefore parallel developing is possible. While submodels getting improved, the whole system, with simple submodels, can be simulated and analyzed in a previous state of the development process.

Modeling elements

Sequential, concurrent and simultaneous statements VHDL-AMS offers the use of common sequential statements like IF-ELSIF-ELSE, LOOP, FUNCTION, PROCEDURES, ... For example:

```
IF a>b THEN
result c='1' AFTER 10 ns;
ELSE
result c='0' AFTER 10 ns;
ENDIF;
```

With the use of concurrent statements parallel systems as digital hardware can be modeled through event driven parallel processes. The processes are simultaneously active and suspended by the WAIT ON , WAIT FOR, WAIT UNTIL statement. Simultaneous statements are used to describe the analog behavior, which are evaluated between discrete events by the analog solver.

```
sum<= a XOR b; - - concurrent discrete statement
carry <= a AND B;
speed == 2*MATH_PI*r*n; - - simultaneous continuous
                                statement
```

Types Additional to types like integer, float, etc. VHDL-AMS allows physical types to represent the

measurements of quantities. They are a multiple of the primary unit.

```
TYPE time IS RANGE ...
min = 60 s; ...
TYPE distance IS RANGE ...
ft = 12 inch;
  m = 1000 nm; ...
```

Objects VHDL knows object classes: constants, signals, variables and files. In the extension AMS two new classes of objects are added to describe analog behavior. The QUANTITIES and TERMINALS with the ACROSS and THROUGH quantity. All quantities are calculated simultaneously by the analog solver.

Quantities are the unknowns over time, and support the signal flow modeling. Beside the explicit quantities in interface declarations implicit quantities describe the behavior. With the following predefined attributes for implicit quantities the model can build up through DAE's (Differential Algebraic Equations):

attribute	result
'DOT	derivative of the quantity to the time (e.g.velocity'DOT)
'INTEG	integral of the quantity over time
'DELAYED(T)	quantity delayed by T
'ABOVE(E)	threshold E for a quantity with boolean result
'ZOH(T,initial_delay)	sampled version of a quantity
'LTF(num,den)	Laplace transfer function of a quantity with numerator and denumerator polynominals
'ZTF(num,den,T,delay)	Z-domain transfer function of the quantity with numerator and denumerator polynominals
'RAMP(trise,tfall)	ramp of a signal with a quantity as result
'SLEW(rise_slope, fall_slope)	signal or quantity with a defined rise or fall time

Terminals are used to interconnect submodels. For conservative system modeling the branch quantities ACROSS and THROUGH are referenced to two terminals. ACROSS and THROUGH represent efforts like in figure 1.

One or more interconnected terminals with branch quantities form nodes and meshs where Kirchoff's laws enforced. In VHDL-AMS terminals belong to a physical nature for example electrical, thermal, hydraulic etc.

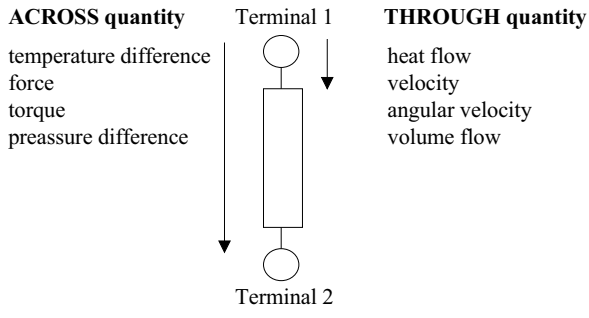

Figure 1: Branch quantities for conservative modeling

Modeling in VHDL-AMS

See references [5], [6], [7].

Each system or subsystem in VHDL-AMS consist of an ENTITY declaration where interface signals, quantities and terminals as well as generics are defined (see figure 2 and section Examples). Different ARCHITECTUREs describe the structure or behavior of the model. The configuration or test bench part describes which architecture belongs to the ENTITY.

Interconnection between the analog and the digital world is handled through events on signals triggered from quantities like q'ABOVE(threshold) (see example 2).

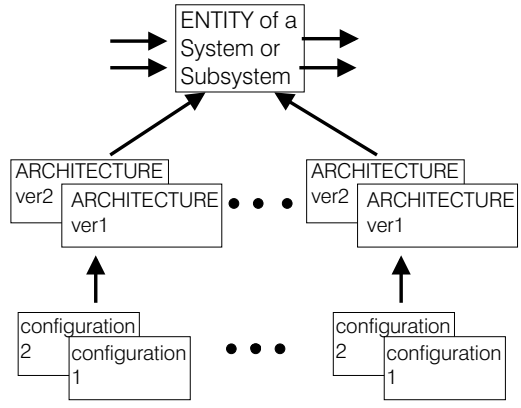

Figure 2: Structure of a VHDL-AMS model

Discontinuities are modeled through the BREAK WHEN and BREAK ON statement (see Example 1). If a discontinuity occurs by a true condition (e.g. q'ABOVE(2.0)) or an event on a signal, the break elements are evaluated.

Systems can build up in the conservative way with interconnected terminals or in the non conservative

way as signal-flow networks where quantities or signals interconnect the submodels. Like in various other modeling systems e.g. Matlab/Simulink.

Simple examples

Example 1: bouncing ball

The example shows a VHDL-AMS model of a ball falling down from an initial height to the ground. The behavior is built up through the BREAK statement for initializing and the discontinuity at the ground hit. The velocity changes after the hit on the ground [1].

```
Library Disciplines, IEEE;
USE IEEE.math_real.all;
USE Disciplines.Kinematic_system.all;
ENTITY bouncing_ball IS
END ENTITY bouncing_ball;
ARCHITECTURE ver1 OF bouncing_ball IS
      QUANTITY s: displacement;
      QUANTITY v: velocity;
      CONSTANT g: acceleration := 9.81;
      CONSTANT Air_Res: real:=0.1;
BEGIN
init: BREAK v => 0.0, s => 30.0;
- - ball hit the ground
b1: BREAK v => -v WHEN NOT(s'ABOVE(0.0));
      v == s'DOT ;
      IF v>0.0 USE
      v'DOT == -g - v**2*Air_Res;
      ELSE
      v'DOT == -g + v**2*Air_Res;
END USE;
END ARCHITECTURE ver1;
```

Example 2: analog to digital converter

The second example describes the behavior of a mixed signal analog to digital converter in conservative semantic. The 'ABOVE quantity of the analog input is used to detect the crossing or the threshold.

```
Library Disciplines, IEEE;
USE IEEE.math_real.all;
USE IEEE.std_logic_1164.all;
USE Disciplines.electromagnetic_system.all;
ENTITY adc IS
GENERIC (vth: real; - - thresholds
conv_time: delay_length := 100 ns);
PORT (TERMINAL ain, ref: electrical;
SIGNAL dout: OUT std_ulogic);
END ENTITY adc;
ARCHITECTURE simple OF adc IS
QUANTITY vin ACROSS ain TO ref;
SIGNAL sdout: std_ulogic;
BEGIN
      sdout <= '1' AFTER (conv_time) WHEN
vin'ABOVE(vth)
   ELSE
      '0' AFTER (conv_time) WHEN NOT
vin'ABOVE(vth)
   ELSE
   'X' AFTER (conv_time) WHEN vin = vth;
   END ARCHITECTURE simple;
   ---------------------------------------
   — Test bench part
   ---------------------------------------
   ENTITY system IS END;
   ARCHITECTURE ver1 OF system IS
   TERMINAL Vin, Vref : ELECTRICAL;
   SIGNAL dout: std_ulogic;
   QUANTITY Uin ACROSS Iin THROUGH Vin TO
Vref;
   BEGIN
   BREAK;
   ENTITY work.adc(simple)
      GENERIC MAP (vth=>1.0, conv_time=>10 ns)
      PORT MAP (Vin,Vref,dout);
   Uin == 1.5;
   END ARCHITECTURE ver1;
```

Tools for VHDL-AMS

Analogy Inc. [8] A preview version, named Verias HDL, of Analogy's VHDL-AMS simulator is available. The Apprentice Version will come out in December. It is a single kernel mixed signal simulator which will support VHDL-AMS language standard completely (digital, analog and mixed technology applications). Extensions to support Verilog-AMS, MAST and SPICE are in development.

Mentor Graphics Corporation [9] A beta version of the VHDL-AMS Design station VDS is tested through different users. The VDS allows input of VHDL-AMS and ELDO/SPICE models. In October 99 Mentor Graphics will offer their VDS. A library for telecommunication can also be obtained from Mentor Graphics.

LEDA S.A. [10] THE LV2S (LEDA VHDL System) with AMS extension for analyzing offers syntax and semantic check and transformation in a VHDL intermediate format (VIF). The LVE (LEDA VHDL Elaborator) is a front-end tool for elaboration of hierarchical designs.

University of Cincinnati [11] The development at the Distributed Processing Laboratory resulted in a VHDL-AMS simulator (SEAMS) as well as a Spice to VHDL-AMS translator: "SPAMS" and graphical user interface for VHDL-AMS simulation.

FTL Systems Inc. [12] The company offers a VHDL / Verilog / VHDL-AMS Compiler / Simulator called Pathway.

Laboratoire d'Electronique of Ecole Centrale de Lyon [13] Development of design tools for automatic design, synthesis and validation of mixed systems.

Conclusion

VHDL-AMS is a standardized powerful hardware description language for mixed multi-domain systems.

The language supplies hierarchical design of behavioral and structural models with different abstraction levels. Modeling with sequential statements, description of parallel processes and the description of analog behavior through DAE's is implemented in VHDL-AMS. Conservative systems, with blocks interconnected by terminals, or non-conservative signal-flow systems can be described.

VHDL-AMS is independent from tool vendors. This makes it suitable as a software intermediate code between developer, manufacturer or tools. The user will have long time benefits. Due to this a consortium of European automotive manufacturers and suppliers has chosen VHDL-AMS as unified language for modeling and model exchange in plants and control units.

In the future VHDL-AMS will be the standard description language in the mixed analog world for electrical systems as VHDL is in the digital world. Further VHDL-AMS will be an independent way to describe mixed multi-domain systems. Probably more tools and interfaces to other description languages as well as high level editing tools, like graphical model design, will appear on the future market.

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Towards Mixed-Signal Idealism: A Single-Kernel Open Simulation Environment

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In the real world, there is no such thing as digital circuitry. All circuits and components are analog elements that respond to things like charge, Kirchoff's voltage and current laws, and other rules of nature. However, analysing circuits in their native analog form would take such an enormous amount of time that, practically speaking, it could not be done.

The solution to this has been to make certain assumptions to simplify the way we characterise devices. One such assumption is that certain device types can have categorised drive and load characteristics that allow us to generalise the turn-on and turn-off times as fixed relationships. Actual waveforms and exponential behaviour then become irrelevant and the number of calculations required to simulate and analyse these devices is significantly reduced.

Unfortunately, not all aspects of a circuit and not all types of devices can be dealt with in this manner. At some boundary, the approximations of digital must be dropped and all the forces of reality considered. As a result mixed-signal simulation is an essential element in today's design environment. But this is not just due the fact that all electronic systems contain some combination of analog and digital circuitry, but also because the size, complexity, and operating speeds of these circuits and systems have grown tremendously over the last decade. In this respect there are several driving forces including the mixed-signal and mixed-technology requirements of system-on-a-chip, the increasing use of soft IP and the need to dramatically improve both design quality and time to market.

From a modelling and simulation perspective, on the digital side, Verilog and VHDL have been formal standards for some time and offer good solutions for simulation and modelling from gates to behavioural level descriptions. To complement this, mixed-signal/ mixed-technology standards have also now emerged – VHDL-AMS and Verilog-AMS. The problem with this process, however, is that there are now so many HDL standards to choose from. The options available virtually creates the necessity for design flows to take account of them all.

Traditionally mixed-signal simulators may be categorised in several different configurations – glued, native and mixed. Each offers trade-offs that should be considered for particular simulation needs.

The glued approach connects an analog simulator directly to a logic simulator via a backplane. In this configuration, both the link between the analog and the digital algorithms and an inter-process communication must function outside the simulators. Thus a glued mixed-signal simulator has added complications not encountered with other approaches. Modelling can also be an issue, since neither simulator may have the capacity to model mixed-signal parts such as A to D converters or pulse-width modulators.

The native configuration combines analog and digital algorithms in one simulator. The advantages are fairly obvious. Integration of analog and digital is relatively tight, because there is no need to try to combine two foreign simulators. Usually, only one simulation netlist is needed, with one set of syntax rules. The price is substantially lower than a two-simulator option. The disadvantages to the native approach include the lack of extra analysis options and model libraries for one of the algorithms. For example, an analog simulator with a built-in digital event queue probably will not have the extra digital analyses, such as worst-case timing or hardware accelerators, available with most logic simulators.

The mixed-simulator configuration is actually an enhancement of the "native-only" approach. A logic simulator is added to a native mixed-signal simulator by merging event queues. The interface between the analog and the digital is still performed inside the native mixed-signal simulator, and the additional digital simulator's event queue connects to the native simulator's event queue via an inter-process communication, such as network sockets. Although this method is more expensive, the additional digital analyses and libraries solve some of the problems associated with the native-only approach.

But nothing remains static. The emergence of true mixed-signal language standards such as VHDL-AMS

and Verilog-AMS, alongside their digital counterparts do not demand just another simulator but preferably a new way of thinking. The logical step was to develop a simulation environment where any of the emerging standard HDL's could be used together, while preserving the inherent advantages of a single-kernel architecture. This open simulation environment vision is the driving force behind Analogy's TheHDL strategy. The environment uses a single-kernel core that efficiently solves both analog and digital parts of a design and keeps them fully synchronised. However, the kernel will also be language-aware, capable of supporting multiple languages including the recent VHDL-AMS standard and Verilog-AMS as well as existing languages such as MAST and SPICE, but incorporating the emergence of new and, as yet, undefined languages and standards.

The open architecture will also help maintain the legacy investments made by customers as well as significantly improve functionality through the active involvement of university research and specialist third party companies. Not only is it the most comprehensive solution available to designers but it gives them the freedom to work with whatever tools are available to them or with the tools they are most comfortable with-without being penalised in terms of speed, performance, or ease-of-use.

The use of a single kernel simulation engine will allow the seamless use of multiple languages. But one of the problems with VHDL-AMS, for example, is that it makes no provision for the implementation of the simulation algorithm, and good solutions will need to allow for time point synchronisation and signal interfacing in order to maintain fundamental speed and accuracy advantages.

Various approaches have been tried to solve this problem. One approach is to force an extremely small analogue time-step which will guarantee having an analogue solution point "close enough" to the digital gate input threshold. How close could be set via a user error control. The problem with this approach is that it is very slow because of the high workload on the analog portion of the simulation kernel. It also includes a significant rounding error, where the threshold point is not hit exactly, and even a seemingly small one nanosecond inaccuracy can be significant for a high-frequency design.

A second approach is to allow the digital mathematical engine to control the time step, and force the analog solver to make a solution at every digital event. This approach means that the analog solution is no longer error-bound and in control of its time-step prediction, so inaccuracies will occur. It is also not possible to analyse designs with close feedback loops using this method. With highly fed-back circuits several repeat iterations at the same time point may be required between the analogue and digital in order to get the correct result.

The most efficient approach is to adopt a mechanism of analog time backtracking of which Analogy's patented Calaveras algorithm is considered the industry's most effective implementation. If the analog solver detects that it has passed an important digital point, it will throw away the solution point it just obtained, and move back in time to make sure it predicts the correct synchronisation point.

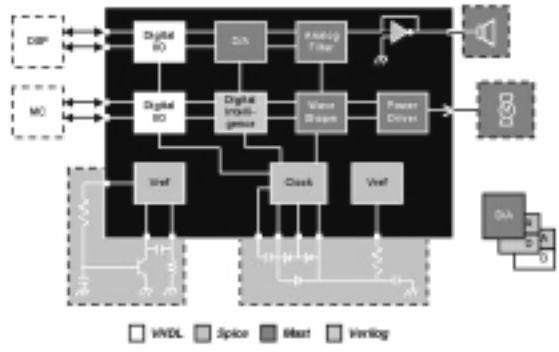

Figure 1

A simple, hypothetical design illustrates the challenge of creating a single environment (see figure 1), regardless of whether the black box is implemented as silicon or as a board.

Part of the system , such as the clock and voltage references, might include detailed analog blocks. These blocks may be designed at the transistor level from the beginning, if they are small enough or SPICE macromodels may also exist. Other parts of the circuit, such as the analog filter, wave shaper and power driver, may be more complex. They may be described at a behavioural level in MAST so the block behaviour can more easily be analysed. They may be described with an analog behavioural language or via macromodels. Part of the design, such as the digital I/O, may be in VHDL comprising either be previously designed blocks or purchased IP. It may be described at either the functional level or at a gate level, depending on whether the blocks are pre-synthesis or post-synthesis. Another part of the design – the digital intelligence – might be in Verilog and again, may be purchased IP or another pre-existing design that has been modified for this purpose.

The real point is that, even though a particular organisation may have standardised their design method-

ology on either VHDL or Verilog, they may still get IP described in the alternative language. Some blocks in a system design might be naturally mixed-signal in nature which is true of data conversion and sensor products, or phase-lock loops. Additionally, there are connections between blocks that are described in different domains. Most systems may include blocks that are mixed-technology components such as motors, actuators or sensors (or speakers.) They may also include complex off-the-shelf components like standard microcontrollers or DSP chips.

Ultimately, to be able to test the whole system, the simulation environment must support both a high-level description of the system in its basic architectural blocks and be able to replace those blocks with the detailed designed blocks to ensure that the system will function as intended.

Finally, the whole design must be tested to ensure that it meets the customer requirements for the total system.

This design complexity places significant demands on the simulation technology. First the new simulation environment must be able to support the traversal of the design hierarchy; it must be able to substitute high level models with detailed models for each and every block as this is the only way to simulate the entire system for complex designs. Transistor level simulation is just to slow and detailed to support systems level design. Design partitioning is getting more complicated and complex and therefore needs to be done automatically to avoid manual errors. These are facts that have been well understood in the digital realm and there are good solutions available in today's popular digital simulators. But mixed-signal is a different story.

Analogy's TheHDL single kernel simulation engine is a logical evolvement of its successful Saber mixed-signal simulator in which the event queues of any standard HDL can be merged. The interface between the analog and digital is performed within the single core. The approach is designed to give designers the freedom to work with whatever tools are available to them or with the tools they are most comfortable with-without being penalised in terms of speed, performance, or ease-of-use.

The use of a single kernel simulation engine within the TheHDL environment coupled with Analogy's patented Calaveras algorithm will generate significant benefits in terms of performance. Recognised as the industry's best method of synchronising the digital and analog algorithms, Calveras enables them to simulate independently until data transfer is necessary, at which point each algorithm alternates taking time steps. However, backtracking is not necessary with this approach because enough previous information is saved to roll back without having to re-evaluate the analog matrix. Calaveras maintains accurate simulation results without any additional analog time steps. This approach will allow for the seamless use of multiple simulation languages in a single simulation environment while maintaining the fundamental speed and accuracy advantages provided by Calaveras and a single-kernel simulation architecture.

In any mixed-signal simulator, translation models must be inserted at the boundaries between analog and digital. The TheHDL core uses Analogy's proven "Hypermodel" technology which gives access to an extensive library of existing models. But beyond the translation models, the simulator also needs to address the boundary because of the additional delay that translation models introduce. The following is a greatly simplified example and it does not address all the issues with the boundaries but it is sufficient to show that developing the simulation technology from a mixed-signal perspective is advantageous (see figure 2).

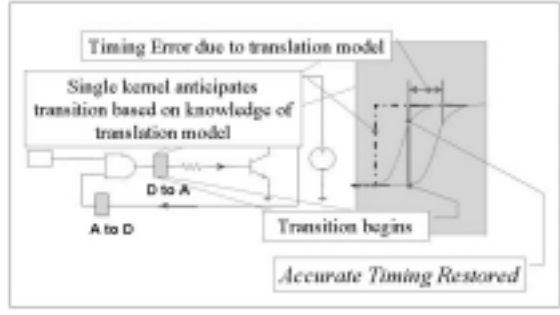

Figure 2

Companies that use standard digital simulators in their mixed signal solutions have a much more difficult time addressing this extra delay, because the problem can only be solved with modifications to a standard digital algorithm. The example shown here is the D to A conversion problem where the translation model cannot begin the transition until the digital gate has made its transition. Because the translation model is converting to analog, the signal has a very real rise time. Therefore there is an additional delay. In order to correct for this, the digital algorithm must know that a translation model is in place and adjust its internal delay.

The kernel of the TheHDL simulation environment is encapsulated within an open architecture, the specifications for which will be published by Analogy. By making them public, Analogy aims to encourage more

Figure 3: The many aspects of openness

innovation in the individual areas for mixed-signal design tools. It should also enable new efforts to start up without having to do everything themselves.

There are also several aspects to the openness (see figure 3).

An extended version of the Advanced Intermediate Representation with Extensibility (AIRE) de-couples the language compilers from the language-aware kernel. Developed as a part of the DARPA VHDL programme, and is currently being supported by FTL Systems as well as Analogy. This will enable industry reuse of compiler technology as well as foster new tool developments such as system design languages, which could be implemented on top of the new kernel by third-party vendors. More competition will result in better tools in the market. AIRE currently supports VHDL-AMS, MAST and SPICE. In the future it will support Verilog-AMS.

The inclusion of a digital co-simulation interface (DCI) allows links with existing digital simulation partners to be maintained and protects customers' existing EDA tool investments. For example, direct co-simulation with digital simulation tools using the Calaveras algorithm will be provided. Such an interface will also make it possible for other simulators to connect to the single kernel with little incremental work required. For example, the TheHDL DCI interface supports thousands of digital models available from Synopsys' Logic Modeling Division as well as hardware/software co-simulation solutions.

With an Applications Programming Interface (API) it is also possible to provide direct access to the control functions of the simulation kernel as well as support other simulator programming interface standards such as Verilog's PLI 2.0. Other tools such as the Testify for mixed-signal test and Inspecs, a mixed-signal statistical analysis tool, along with design optimisation tools will also be able to connect via this interface.

Simulation is a means to an end. It can generate lots of data, but post processing tools transform data into information that can be used to make decisions. A mixed-signal waveform database interface will open up access to simulation results for other post-processing analysis tools. Additionally, this addresses customers' requirements to consolidate these tools for their many different simulators and make their own choices about post-processing tools.

The problem with standards in simulation is that there are so many of them and the way that the industry is moving in terms of SoC and IP developments, designers will probably need to access them all. While this will be achievable from a simulation perspective with the point solutions available today, it is likely to be a painful process both in terms of time and manual partitioning. A single kernel created within the context of an open architecture provides an ideal solution in the creation a mixed-signal, mixed-language, mixed-level simulation environment that supports systems design.

Fuzzy Sets and Fuzzy Logic: Discovery and Controversy

To view the evolution of fuzzy logic in a proper perspective it is necessary to start with a clarification – a clarification of the meaning of "fuzzy logic." A source of common misunderstanding is that the term "fuzzy logic" has two distinct meanings. In a narrow sense, fuzzy logic is a logical system which underlies the modes of reasoning which are approximate rather than exact. But in a wide sense – which in dominant use today – fuzzy logic is much more than a logical system; it is, in effect, coextensive with fuzzy set theory. More specifically, fuzzy logic in its wide sense, FL, has four principal facets which overlap and have unsharp boundaries.

The first facet, FL/L, is the logical facet – a facet which is coextensive with fuzzy logic in its narrow sense.

The second facet, the set-theoretic facet, FL/S, is the part of FL which is concerned with classes which have unsharp boundaries. My 1965 paper on fuzzy sets dealt with this facet. Today, most of the papers in the mathematical literature on fuzzy sets relate to the set-theoretic facet.

The third facet, the relational facet, FL/R, is concerned with representation and analysis of imprecise dependencies. Most applications of fuzzy logic, especially in the realms of consumer electronics, industrial systems and control fall within the province of this facet.

The fourth facet, the epistemic facet, FL/E, is concerned with knowledge, meaning and information. Possibility theory is a part of this facet, as is possibilistic logic, which is shared with the logical facet.

The core of FL is centered in two basic concepts: fuzzification and granulation, along with their conjunction, fuzzy granulation. Fuzzification, or f-generalization, is a mode of generalization in which a set is replaced by a fuzzy set. Fuzzy granulation, or f.g-generalization, is a mode of generalization in which a fuzzy set is partitioned into fuzzy granules, with a granule being a clump of points (objects) which are drawn together by indistinguishability, similarity, proximity or functionality. For example, the fuzzy granules of a face are the nose, chin, cheeks, lips, etc. Fuzzy granulation plays a pivotal role in fuzzy logic and its applications; it underlies the two most important concepts in FL, namely, the concepts of a linguistic variable and fuzzy if-then rule sets. These concepts were introduced in my 1973 paper, "Outline of a New Approach to the Analysis of Complex Systems and Decision Processes," and marked a new direction in fuzzy logic and its applications. Reflecting the deep-seated tradition of respect for numbers and derision for words, the initial reaction to these concepts was a mixture of hostility and warm embrace.

A new and important direction in fuzzy logic is related to what may be called the computational theory of perceptions (CTP). This theory, which is based on fuzzy logic, provides a machinery for processing of information which is perception-based, e.g., "it is likely to rain later in the evening," "most Swedes are blond," etc. Existing scientific theories do not have this capability. By providing a machinery for computation with perceptions, CTP opens the door to a major enlargement of the role of natural languages in scientific theories, especially in probability theory, decision analysis and control. A countertraditional move in this direction has the potential for leading to a significant paradigm shift in both basic and applied sciences.

Lofti A Zadeh, Professor Emeritus Electrical Engineering and Computer Science Director, Berkeley Initiative in Soft Computing (BISC)

From an announcement of Professor Zadeh's seminar (Berkeley Initiative in Soft Computing (BISC)), at University of California, Berkeley, on October 27, 1999.

EUROSIM
the Federation of European Simulation Societies

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 27-30, 2001.

EUROSIM is governed by a Board consisting of one representative of each member society, plus the organizer of the last EUROSIM Congress (past president) and the organizer of the coming EUROSIM Congress (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. Furthermore members can subscribe the scientific journal *Simulation Practice and Theory* (SIMPRA) at a significantly reduced price.

Reminder: the EUROSIM Board meeting and Executive Board meeting and the Editorial Board meeting SIMPRA will take place in Prague, Monday, June 19th, 2000.

EUROSIM WWW Server:
http://www.eurosim.org/

EUROSIM Societies

ASIM

ASIM (*Arbeitsgemeinschaft Simulation*) is the association for simulation in the German speaking area. ASIM was founded in 1981 and has now about 680 individual members.

ASIM General Assembly

On the occasion of the annual ASIM conference (Weimar, September 1999) a general assembly took place. In this annual general assembly the ASIM Board reports to the members, and the members can decide about new developments, etc. Every third year the assembly also has to elect the ASIM Board – the case this year in Weimar.

Mr. Möller, the ASIM President opened the meeting with a report on the activities of the last year, Mr. Breitenecker gave a report on membership affairs and administration and sketched the development in EUROSIM and SNE, Mrs. Bausch-Gall and Mr. Breitenecker reported on finances, Mr. Kampe summarised the new developments in ASIM Publications (publishing co-operation with SCS Europe now established). In the following the speakers of the nine working groups sketched developments, publications and events of the groups.

In order to meet the new developments the installation of a new working group "Methods" was suggested – combining the three "methodical" groups FG1, FG2, FG3. This would result also in a better distribution of members in the nine working groups, being now in percent 5:11:3:7:28:25:7:7:7. While the speakers of FG1 and FG2 are in favour of this plan, FG3 is hesitating. It was decided to postpone decisions in order to gain more information.

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 27-30, 2001, Delft, The Netherlands

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

Human beings are not only the subjects, but also the designers and implementers of their environment. Particularly during the last decade, we have created an environment with increasing opportunities for improvement of human circumstances. This environment can be characterised by rapid changes and dramatically increasing technological and social complexity. It behooves us to recognise that in this rapidly evolving techno-social climate, technology design & development and the operation of our social structures are strongly entangled.

The human community at the beginning of the 21st century is presented with an enormous and unprecedented opportunity to quantify this entanglement and the related uncertainties. It is very important to have the tools and methodology to simulate the directions to be taken and paths to be avoided. Simulation techniques using both the best methodology and technical computer capabilities can and should be applied to shape an acceptable global society.

With these thoughts in mind, the organisers of the 2001 EUROSIM Congress invite persons in the scientific and industrial societies to contribute to the development of simulation approaches wherein the mutual influence of science and applications is integrated. The art of simulation has now spread to many scientific disciplines and technologies. A major objective of this Congress is to link tools, techniques and methodologies to support the integrated system simulation approaches required to manage the functioning of our evolving environment.

Other relevant information such as: the BioMedSim conference, the scope, special symposia, suggested topics, key dates, guidelines for abstracts, registration fee, exhibitions etc. can be found on our website. The site will regularly be upgraded.

Last topic of the assembly was the election of the ASIM Board. For the eight fixed positions in the Board the members could choose out of twelve candidates. Members could vote for up to eight candidates. The new Board consists now of the following persons: Bausch-Gall (Munich, 81%), Breitenecker (Vienna, 81%), Hohmann (Magdeburg, 51%), Hrdliczka (Zurich, 72%), Kampe (Stuttgart, 51%), Möller (Hamburg, 61%), Schwarz (Dresden, 53%), Wenzel (Dortmund, 81%).

In November the full Board (the elected persons and the speakers of the working groups) will meet in order to elect speaker, vice-speaker, treasurer and to discuss other agendas.

Six of the eight newly elected Board members.
From left to right: D. Möller, P. Schwarz, I. Bausch-Gall, F. Breitenecker, G. Kampe, R. Hohmann.

ASIM Book Series

Two books will appear in the ASIM books series in 1999. Further books are planned in 2000. The following state of the art books are presented by two working groups:

Helena Szczerbicka; Thomas Uthmann: *Modellierung, Simulation und Künstliche Intelligenz, Fortschritte in der Simulationstechnik.*

Sigrid Wenzel: *Referenzmodelle für die Simulation in Produktion und Logistik.*

Both books shall appear in December 1999 in the SCS Publishing House. For more information contact the speakers of the working groups. Both books can be ordered from ASIM. Please contact (earliest in January) Ingrid Bausch-Gall for prices and further information.

ASIM '99, Weimar

The 13th conference on simulation techniques took place in Weimar from 21 to 24 of September 1999.

The conference was organized on behalf of the ASIM (the association for simulation in the German speaking area) by the scientific centre of applied computer science and mathematics of the Bauhaus-University Weimar and the Institute of computer science in business of the Technical University Ilmenau. Chairman of the conference was Professor Dr. G. Hohmann, Weimar.

About 200 specialists of simulation in business and research exchanged their experiences. The first day of the conference is traditional the day of the user group meetings and tutorials.

Since it is the 250th anniversary of Goethe's birthday this year, the conference was opened by a speech on "Goethe and the natural sciences" held by Professor Dr. Kuhn, Marbach.

Six main lectures showed the wide spectrum of simulation techniques in research and business. The lecturers dealt with problems of simulation of electronical switching, of building processes, of transport, of development processes in automobile industry, as well as with problems of micro-macro-simulation and simulation of human behaviour. About 50 papers, given in parallel sessions, on various topics were discussed about. The "*Praxisforum*" (organized by E. Hessel) on electronical simulation as well as the workshop on the VDI guidelines "Simulation" are to be mentioned.

E. Hessel, Dr. Werner Dirschmid (chief simulationist at AUDI, he gave a main lecture at the conference), F. Breitenecker

The accepted papers of the conference had been published before the conference in the proceedings of ASIM '99.

A software and a poster exhibition completed the 13th conference on Simulation techniques. The exhibitors had the possibility to speak about their software products and the use of them in a "*Produktforum*".

With Weimar as the cultural city of Europe 1999, the conference was able to offer an interesting and various choice of events besides the scientific programme. These were guided sightseeing in the historical town of Weimar, the Goethe house, the Schiller house as well as a visit to the memorial Buchenwald, the former national

socialist concentration camp. Also information on the Bauhaus was provided for all those who were interested in. The evenings gave chance to all participants to relax or to discuss the problems of the day within informal meetings.

The participants of the 13th conference on simulation techniques had significant and eventful days in Weimar. The organisers would like to say "Thank you" to all who helped, with papers and discussions, to make the conference a success.

Prof. Hohmann and his wife are thanked by D. Möller and F. Breitenecker

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WWW-Information:

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

Email:

info@asim-gi.org (for information)
admin@asim-gi.org (for adminstration)

ASIM Meetings to come

For further information contact the speakers of the working groups or one of the contact persons above.

February 21-22, 2000: Meeting of the working group "*Simulation Technischer Systeme*" in Esslingen. For more information contact Prof. Gerald Kampe or the speaker of the working group.

March 8-9, 2000: 9th Conference of the working group "*Simulation in Produktion und Logistik*" (FG 6), Berlin.

March 12-14, 2000: 10th workshop of the working group "*Informatik im Umweltschutz*" in Hamburg.

March 13-15, 2000: Seventh symposium "Simulation for managerial decision support – new tools and approaches in practice" in Braunlage.

March 20-21, 2000: Joint meeting with the subject "*Multiagentensysteme und Individuenbasierte Simulation*" of the working groups "*Simulation paralleler Prozesse*" and "*Simulation und KI*" in Würzburg. For more information contact the speakers of the working groups.

April 6- 8, 2000: Meeting of the FG "*Simulation in Biologie, Medizin und Ökologie*" at Burg Ebernburg.

September 18-21, 2000: ASIM'2000 will be held at Universität Hamburg.

Conferences with ASIM participation

February 2-4, 2000: 3rd MATHMOD Vienna.

May 2-3, 2000: Agent–Based Simulation, on the Occasion of Prof. Dr. B. Schmidt's 60th Birthday in Passau.

September 20-22, 2000: ESS at Universität Hamburg.

Meetings from co-operating societies

May 11-12, 2000 in Baden-Baden: *Computational Intelligence und industrielle Anwendungen*. VDI / VDE-Gesellschaft / GMA und GI.
For more information contact: VDI/VDE-Gesellschaft Mess- und Automatisierungstechnik, Frau A. Schillings, Postfach 10 11 39, D-40002 Düsseldorf, email schillings@vdi.de

Working Groups (Fachgruppen FG)

"Verteilte Systeme und parallele Prozesse" (FG 1)

The working group will organize a workshop in March 2000 with the subject "*Multiagentensysteme und Individuenbasierte Simulation*" together with the working group "*Simulation und KI*" in Würzburg. For more information contact the speakers of the working groups.

Actual information may be found in the WWW: http://www.eas.iis.fhg.de/asim/ws99/ or http://www.asim-gi.org/fg1/

Speaker: Dr.-Ing. Peter Schwarz, Fraunhofer-Institut IIS/EAS, Zeunerstr. 38, D-01069 Dresden Tel: +49-351 4640 730, Fax: +49-351 4640 703, email: schwarz@eas.iis.fhg.de

"Simulationssoftware und -hardware" (FG 2)

The working group supports the idea of combining ASIM's three methodological working groups in a bigger group "Methods" in order to meet the new developments more efficiently.

As already announced in SNE 25, the working group tended from pure "software and hardware" to a more methodological view with classical numerical methods and software, with new methods and software in soft computing and computer algebra, etc. This development results in the fact that the intersection with the other methodological groups becomes bigger and bigger – so that the establishment of a combined group "Methods" is a natural development.

The new developments are also mirrored in the activities of the working group. The "Comparison of Simulation Software" (together with ARGESIM Vienna) change to "Comparison of Simulation Techniques and Methods" – results of these comparisons are published at the web (databased classification of the comparison solutions – up to now 180).

Also the seminars on "Modelling and Simulation" (at Vienna University of Technology) put more emphasis on different approaches than on software itself: The "ACSL-Seminar" on December 13, 1999 will concentrate on hybrid modelling approaches, and the "DYMOLA-Seminar" on December 14, 1999 will discuss OO-approaches. Within these series the working group and ARGESIM will also co-organise a workshop "Simulation in Production and Logistics" (Nov. 18, 1999) with contributions of statistical methods and on reliable software.

In February 2000, the working group organises special sessions at the conference 3rd MATHMOD.

The working group is seeking for people interested in administrating, governing, supporting the workgroup, interested in preparing publications in the relevant area, etc – with respect to the further developments.

Speaker: Prof. Dr. Felix Breitenecker, TU Wien, Abt. Simulationstechnik, Wiedner Hauptstraße 8-10, A-1040 Wien, Tel: +43-1 58801 11452, Fax: +43-1 58801 42098, email: Felix. Breitenecker@tuwien.ac.at
Vice-speaker: Dr. Thomas Schulze, Univ. Magdeburg, Inst. f. Techn. Informationssysteme, Universitätsplatz 2, D-39106 Magdeburg, Tel: +49-391 67-12017, email: tom@isg.cs.uni-magdeburg.de

"Simulation und künstliche Intelligenz" (FG 3)

The field of computer simulation is about 40 years old and still vibrantly growing and trying to achieve a cohesive organization of technical knowledge. Simulation like most disciplines, can be generally divided into methodology and applications. The importance of methodology and not just applications cannot be overemphasized. Simulation has a core of knowledge which is independent of applications. Methodology can be applied to all sorts of practical real-world problems, but it is a substantial field by itself. As technology develops faster hardware, old forms of simulation are made faster and new varieties of simulation emerge through an *extension* process. Extending the core simulation knowledge involves taking concepts with those outside of the simulation discipline.

The working group FG 4.5.3 is a forum for exchange of information, studying interactions between Artificial Intelligence (AI) and the field of Computer Simulation and working out of suggestions how the topic of AI can be integrated with Simulation.

There are a lot of aspects of AI which are particularly important to simulation, e.g. use of natural language, use of qualitative knowledge, encoding of decision making processes, agent techniques etc. Interests of the working group FG 4.5.3 focus on connecting common sense knowledge to the detailed knowledge available for modeling and simulation of dynamic systems. We need ways to develop methods for guiding tools in engineering simulation models, building qualitative models, representing ambiguous data etc.

The FG 4.5.3 emphasizes the importance of learning methodological concepts from real world practical applications.

Programs of our annual workshops and a recent book "*Modellierung, Simulation und Künstliche Intelligenz*", SCS Publishing House, 1999, contain a balanced list of topics combining practical applications, as well as simulation and AI issues.

The next 14th Workshop of the working group, focussed on the "Multi-Agent Systems and Individual-based Simulation" will be held in Würzburg, Germany, March 20-21, 2000.

For more information see
http://ki.informatik.uni-wuerzburg.de/ag-sim/

For discussions, exchange of ideas and inquiries please use our mailing list:
ai-simulation@ki.informatik.uni-wuerzburg.de
Registration to:
majordomo@ki.informatik.uni-wuerzburg.de
subject: <empty>
body: subscribe ai-simulation

For more information please visit the workshop site.
http://www.tu-chemnitz.de/~jflo/ModSim/ASIM/

Speaker: Prof. Dr.-Ing. Helena Szczerbicka, Universität Bremen, Rechnerarchitektur und Modellierung, Fachbereich 3 - Informatik, Postfach 33 04 40, D-28334 Bremen, Tel: +49-421 218 7389 or 7390, Fax +49-421 2187385, email: helena@informatik.uni-bremen.de
Vice-speaker: Dr. Thomas Uthmann, Johannes-Gutenberg-Universität Mainz, Institut für Informatik, Staudingerweg 9, D-55099 Mainz, Tel: +49-6131 39-3610, Fax +49-6131 39-3534, email: uthmann@informatik.uni-mainz.de

"Simulation in Medizin, Biologie und Ökologie" (FG 4)

Speaker: Prof. Dr. Dietmar Möller, Universität Hamburg, FB Informatik, Vogt-Kölln-Str. 30, D-22527 Hamburg, Tel.: +49-40 5494 2438, Fax: +49-40 5494 2206, email: Dietmar.Moeller@ informatik. uni-Hamburg.de
Vice-speaker: Prof. Dr. Otto Richter, TU Braunschweig, Institut für Geographie und Geoökologie, Langer Kamp 19c, D-38106 Braunschweig, Tel: +49-531 391 5627, Fax: +49-531 391 8170

"Simulation technischer Systeme" (FG 5)

At the last ASIM conference the working group organized again a socalled "*Praxisforum*", this time with the special focus on simulation and modelling in electronics.

Further activities are:

- the next meeting at FHT Esslingen in February 2000 organized by Prof. Gerald Kampe and Prof. Hermann Kull and others. ASIM members receive an invitation to this meeting with the mailing of this issue of SNE,
- Some members of the working group write articles for the state of the art book edited by Ingrid Bausch-Gall, planned to appear in the first quarter 2000.

The technical paper on VHDL-AMS in this issue is an outcome of ASIM's work in this area: Mr. Commerell is an active member of FG 5 and a specialist in VHDL-AMS, he cooperates with developers of VHDL-AMS, amongst them Analogy (see paper of Mr. Patterson).

A more detailed report on the activities of the working group see also *ASIM-Nachrichten,* November 1999.

Speaker: Ewald Hessel, Hella KG Hueck&Co., Abt. EL-R, Werk II, Beckumer Straße, D-59552 Lippstadt, Tel: +49-2941 38 8572, Fax: +49-2941 38 8427, email: hessel@hella.de
Vice-Speaker: Dr. Achim Wohnhaas, debis Systemhaus, Project Division, Fasanenweg 9, 70771 Leinfelden-Echterdingen, Tel: +49-711 972 5333, Fax: +49-711 972 1913, email: awohnhaa@debis.com

"Simulation in Produktion und Logistik" (FG 6)

The next national event arranged by the ASIM Working Group is the working group meeting on November 18th, 1999, at Infineon Technologies AG, München, Germany. For detailed information about this event and the planned topics please refer to http://www.asim-pl.uni-kassel.de/ (or http://www.asim-gi.org/fg6/) or contact Mrs. Dr. Sigrid Wenzel by email.

The next (first time) international event will be the 9th Working Group Conference on March 8 - 9, 2000 in Berlin, Germany. Please contact Dipl.-Phys. Markus Rabe, Fraunhofer Institute for Production Systems and Design Technology (IPK), for further information (email: Markus.Rabe@ipk.fhg.de) or take details from the enclosed program.

Speaker: Dr. Sigrid Wenzel, Fraunhofer Institute for Materialflow and Logistics, Joseph-von-Fraunhofer-Str. 2-4, D-44227 Dortmund, Tel. +49-231 9743 237, Fax: -234, email: wenzel@iml.fhg.de
Vice-speaker: Mr. Hans Joachim Gora, Adam Opel AG, ITDC-Manufacturing Engineering, Strategies & Planning, D-65423 Rüsselsheim, Tel.: +49-6142 7 72164, Fax -61763, email: hans.joachim .gora@de.opel.com

"Simulation in der Betriebswirtschaft" (FG 7)

Speaker: Prof. Dr. W. Hummeltenberg, University of Hamburg, Institute for Computer Science in Business Administration, Max-Brauer-Allee 60, D-22765 Hamburg. Tel.: +49-40 4123 40 23, Fax: +49-40 4123 64 41, email: wi@mba.uni-hamburg.de
Vice-speaker: Prof. Dr. Biethahn, Georg-August-University of Gšttingen, Platz der Göttinger Sieben 5, D-37073 Göttingen.

"Simulation von Verkehrssystemen" (FG 8)

Speaker: Dipl.Ing.Andre Graber, Drusbergstr. 39, CH-8703 Erlenbach, Tel: +41-1 9120640, Fax: +41-1 9120641, email: a.graber@ bluewin.ch
Vice-speaker: Dr. Thomas Schulze, Univ. Magdeburg, Inst. f. Techn. Informationssysteme, Universitätsplatz 2, D-39106 Magdeburg, Tel: +49-391 67 12017, email: tom@isg.cs.uni-magdeburg.de

"Simulation in Umweltanwendungen" (FG 9)

The annual meeting of the working group took place on March 14 - 16 in Koblenz. The contributions are published in the new volume of the series '*Umwelt-informatik aktuell*' of the Metropolis publishing house. This year, the former speaker, Prof. Grützner, reached retirement age, so elections for the speakspersons of the group had to be held. The results are:

Speaker: Dr.-Ing. Jochen Wittmann, University of Rostock, Vice-Speakers: Dr. Rüdiger Hohmann, Otto-von-Guericke University of Magdeburg, Prof. Dr. Bernd Page, University of Hamburg.

In 2000, the group will meet from March 12 to 14 in Hamburg. Main topics of the workshop will be: object-oriented and individual-based modelling techniques, ecological models, traffic and environment. For a detailed call for contributions and any other information on the work of the group see the WWW-pages http://www.informatik.uni-rostock.de/FB/Praktik/Mosi/FG/ (or http://www.asim-gi.org/fg9/) or contact one of the speakers.

Speaker: Dr.-Ing. Jochen Wittmann, University of Rostock, Computer Science Department, Research Group Modelling and Simulation of Computer Systems, Albert-Einstein-Str. 21, D-18059 Rostock, Tel.: +49-381 498 3368, Fax: +49-381 498 3426, email: wittmann@informatik.uni-rostock.de
Vice-speakers: Dr. Rüdiger Hohmann, Otto-von-Guericke University of Magdeburg, Department of Simulation and Graphics, PF 4120, D-39016 Magdeburg, Tel.: +49-391 671 2017, Fax : +49-391 671 1164, email: hohmann@isg.uni-magdeburg.de
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Ingrid Bausch-Gall

Call for Papers

Agent–Based Simulation

on the Occasion of
Prof. Dr. B. Schmidt's 60th Birthday
May 2-3, 2000 in Passau, Germany
organized by SCS and ASIM.

Topics:
Basic Methodology
Agent-Architectures
Model-Specification and Languages
Mobile Agents
Multi-Agent Systems: Interactions and Communication
Micro-Macro Simulation and Emergent Behaviour
Decision Making and Strategies
Applications in: Biology, Behavioural Sciences, Social Systems and Artificial Societies, Economics and Market Systems, Business Process Management, Manufacturing Management, Cooperative Task Management, Medicine and Health Care, Computer Science, Agents in the Internet

For further information see:
http://www.or.uni-passau.de/workshop2000/

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 64 individual members. The annual membership fee is equivalent of 8 German marks for regular members, and 2 German marks for students.

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Activities

- Co-organizing the 22nd International Conference *"Information Technology Interfaces" ITI'2000*, Pula, Croatia, June 13-16, 2000.
- Regularly organizing a simulation seminar held at the Faculty of Economics, University of Zagreb.
- Work on scientific projects in discrete and continuous 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.
- Preparing publication of 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. Its address is: http://www.rasip.fer.hr/nastava/mis/
- Initial WWW site of the society is: http://rudjer.irb.hr/~crossim/
- The CROSSIM e-mail distribution list at the Computing Centre of the Univ. 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 once just send an e-mail to: CROSSIM@CARNET.HR

V. Bosilj Vuksic

CSSS

General Information

CSSS (The Czech and Slovak Simulation Society) has about 90 members in 2 groups connected to the Czech and Slovak national scientific and technical societies. 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 Events

The 21st International Colloquium on "**Advanced Simulation of Systems**" (ASIS 1999) took place on September 14 - 16, 1999 in Krnov, Czech Republic. It was organised by the Department of Computer Science FEEI VŠB, Technical University Ostrava and the Department of Computer Science of FEECS University of Technology, Brno. The Technical journal AUTOMATIZACE Praha was a medial sponsor. The chairman of the international program committee was Dr. Ing. Jan Stefan. One of the interesting topics was "New Modelling Paradigms" with 5 contributions. The proceedings of the Colloquium have 410 pages, with 64 reviewed papers. About 70 participants from Czech republic, Slovakia and Poland attended the workshop.

The 3rd International Workshop "**Modelling and Simulation in Management Informatics and Control**" (MOSMIC'99) that took place on October 5-7, 1999 in Zilina-Sulov, Slovak republic, was organised by the Faculty of Management, Control and Informatics, University of Zilina, Slovak Society for Applied Cybernetics and Informatics, Bratislava and CSSS. The chairman of the international program committee was Prof. Mikulas Alexik. The proceedings of the workshop have 250 pages with 37 reviewed papers. Over 30 attendants participated. The CSSS board meeting took place on Wednesday, October 6, 1999, during the workshop.

Coming Events

The 34th International Conference on "**Modelling and Simulation of Systems**" (**MOSIS 2000**) will take place on May 2-4, 2000, Roznov pod Radhoštem, Czech republic. The chairman of the international program committee is Dr. Ing. Jan Stefan. For more information please email to jan.stefan@vsb.cz

The 22nd International Workshop "**Advanced Simulation of Systems**" (**ASIS 2000**) will take place in the Moravian town Sv Hostýn, Czech republic on September 12-14, 2000. The chairman of the international organising committee is Dr. Ing. Jan Stefan.

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M. Alexík

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 and IMACS and the Chinese Association for System Simulation.

DBSS 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
Noordeindseweg 61
2651 LE Berkel en Rodenrijs, The Netherlands
Tel: + 31-10 51 12714
Fax: +31-10 51 13883
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

Past Events

Issues in Modeling and Simulation

On July 2, 1999 a one-day symposium was held as a tribute to Prof. Maurice Elzas. Approximately eighty people attended the symposium. The majority came from The Netherlands, however some people came from other European countries such as Finland, Germany and Hungary. The symposium was held at the Conference Center 'De Wageningse Berg' in Wageningen, The Netherlands. The conference center is close to the river Rhine. Socially and scientifically the conference was a great success. Maurice Elzas chose the theme of the symposium.

Speakers at the symposium were invited because of their long time cooperation with Maurice S. Elzas and the respect they have in the simulation community. The speakers were Prof. Dr. B. P. Zeigler from Arizona Center for Integrative Modeling and Simulation, University of Arizona; Prof. T. I. Ören, Professor Emeritus of University of Ottawa, Canada; Prof. Dr. F. R. Pichler, Johannes Kepler University Linz, Austria; Prof. Dr. G. Sheng, Faculty of Environmental Studies, York University, Canada; and Prof. Dr. Jack P. C. Kleijnen, Tilburg University, The Netherlands.

The title of Zeigler's contribution was 'Modeling and Simulation Methodology: Have we made any progress?'. In this presentation he sketched the developments in modeling and simulation methodology during the last thirty years. The most important issue raised by Zeigler was the High Level Architecture and distributed simulation architecture.

Ören proved that without a sound documentation of the purpose and valid experimental frames of the model, for example politicians could abuse the results of the experiments with the model easily. He presented interesting anecdotes illustrating that. Furthermore, Ören presented an overview of ethical aspects in relation to modeling and simulation.

The contribution of Pichler was titled 'Modeling Complex Systems by Multi-Agent Holarchies'. This lively presentation was based on Koestler's holarchie. According to Koestler a holarchie provides the conceptual framework for modeling and simulation of self-organizing open hierarchical systems.

Sheng's presentation was titled 'Some ethical considerations in Modeling and Simulation, some lessons learned from Maurice S. Elzas'. In this presentation Sheng referred to simulation studies related to nuclear waste. He stressed the importance of ethics in this typical discipline where decisions will have effect on the environment for ages.

Kleijnen's presentation has the title 'Ethical Issues in modeling: personal reflections'. This presentation payed special attention to some controversial applications of models, for example in crime, war and the nuclear field. His advice to the simulation community is that modelers should try to develop robust models; that is, models that are not very sensitive to assumptions. Furthermore modelers should document their models in a way that replication of the modeling experiments is possible conform the basic principles in science.

Dirk L. Kettenis
Wageningen University, The Netherlands

Visit Beijing - IFORS'99 Conference and meeting CASS and DBSS

Undersigned attended the 15th Triennial World Operations Research. The Conference had more than 800 participants from over 30 countries and presented an interesting mix between theory and practice, though some theoreticians complained about some real world applications.

The Conference was very well organized, the location, The Friendship Hotel, was a good choice and also the social program provided many possibilities to get acquainted with Chinese life and habits. In the mid of the Conference, all participants visited the Ming tombs and the Great Wall at Badaling. Very impressive architectural objects built in a time that the rest of the world was predominantly busy with bare survival via hunting and farming. It is often not known in the West that the Chinese culture dates a long time back, about 3000 to 4000 BC(!), that the Chinese invented, among many things the compass and the gunpowder, and that they adopted many influences from other areas and made them, so to say, Chinese.

The themes of the Conference gave a good impression of the rapid spreading of OR methods from military into many societal sectors. A latest trend is the use of OR methods in rather ill-defined systems such as societal systems and vague business environments. Also, more and more scenario building techniques are seen to answer what-if-questions. All kinds of simulation tools are heavily used in OR. Various software houses offered their products in a simultaneous commercial exhibition. Many contacts were made with different participants, and we have invited some of them for the EUROSIM 2001 Congress, which will be held in Delft 27-30 June 2001. We had the opportunity to organize a meeting with the Chinese Association for System Simulation (CASS), where were present the president of this association Prof. Wang Xingren, accompanied by dr. Yang Yawei (secretary) and Prof. Zhang Ming-Lian. We were able to finalize the cooperation agreement between CASS and DBSS. In the meantime, the contract has been signed by both parties. Both societies expect a lot from this cooperation which is focused on the exchange of ideas, persons, combined workshops, and mutual help on congresses and conferences. We met also Prof. Bo Hu Li, the vice-chairman of CASS, and on his invitation Dorien De Tombe gave a presentation at the School of Economics and Management of the Tsinghua University in Beijing. The Tsinghua University is one of the biggest universities of China. It was a nice opportunity to meet the System Engineering research group of Prof. dr. Jian Chen and to discuss with them the latest developments in Operations Research: Methodology for Complex Societal Problems (Euro OR Working Group 21) and to explain her own method for handling complex societal problems: the Compram method. Complex societal problems deal with issues such as finding new markets for a company, the flooding of the Yanshe river, or looking for national solutions for transport problems.

The next Operations Research conferences will be held in Budapest 2000 (Euro OR) and Rotterdam 2001 (Euro OR) and in Edinburgh 2002 (IFORS). In summary, the visit was most interesting and fruitful. The Chinese clearly follow their own road to the 21st century. They do it in their own way, which often deviates from the ways we know in the West. For the readers interested in some backgrounds of the political and economical issues in present-day China we recommend reading the excellent book of Laurence J. Brahm and Stephen X.M. Lu, Re-engineering China, Naga, Hong Kong, 1994 (ISBN 962-8319-05-1).

For the readers who are interested in how the Chinese treat internal and external values and in which way they perceive things the book of Michael Harris Bond (Ed.) is a must. The relevant data of his book are: The Psychology of the Chinese People, Oxford University Press (China) Ltd., Hong Kong, 1987, paperback edition (ISBN 0-19-584279-0). For readers who are interested in the life of Chinese women against the background of political changes, we recommend the well known book Wild Swans, Tree daughters of China, by Yung Chang, London, Flamingo, 1993, paperback edition (ISBN 000- 637-49-21), La Couleur du Bonheur by Wei-Wei, Paris: Denol, 1996 (Dutch: De kleur van geluk, Breda, Uitgeverij De Geus, ISBN 90-5226-563-1) and The Lily Theater by Lulu Wang to be published 2000 London: Hodder (Dutch: Het lelietheater, Amsterdam: Vassalucci, 1997, ISBN 90-5000 -032-0).

Dorien DeTombe (TU-Delft), Iva and Wim Smit (DBSS)

Coming Events

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 27-30, 2001, Delft, The Netherlands

For more information, see page15, or visit our website

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

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

EUROSIM 2001 Organisation
c/o Mrs. T. Tijanova
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Faculty of Information Technology and Systems
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If you need information by telephone please contact:

Marja Dekker
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Arnold Heemink
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Vacancies

The Department of Informatics of the Faculty of Economics at Erasmus University Rotterdam in The Netherlands has a few vacancies for the position of lecturer/researcher in Simulation. For more information, see the website: http://www.few.eur.nl/few/people/adebruin/vacatures/vacancies.html

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, Modelling & simulation of discrete events systems.

Modeling & 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. Simulation is used and studied both by academic institutions and by industrial companies.

To improve the necessary synergy between industry and academia people in the area of system modelling, the series of conferences "MOSIM" (Modelling and simulation)has been initiated after the success of a first conference on modeling and simulation in production management in Clermont Ferrand (with the support of the AFCET and the French CNRS through the "GDR automatique").

Contact: Professor Henri Pierreval, IFMA, Campus des Cezeaux, BP 265, F-63175 Aubiere, Cedex, France. Tel. +33-4 73 28 81 06, Fax. +33-4 73 28 81 00, email pierreva@ifma.fr

Modelling & simulation of continuous systems: This pole has been working for several years and has already organised 3 workshops (2AO92, 2AO94, 2AO96) which grouped industrials and academics in the field of modelling and simulation of continuous systems. It has also produced a document for the evaluation of modelling and simulation software which was published in the EUROSIM 1995 Congress in Vienna. The pole is presently reorienting its work towards the organisation of one day workshops on specific subjects. It had organised in April of this year the BioMed Sim'99. It will organise in 2001 the 2nd BioMedSim '01 in parallel with the EUROSIM congress.

Pole and Conference contact: Prof. Y. Hamam, Groupe ESIEE, Cité Descartes, BP 99, 2 Bd. Blaise Pascal, F-93162 Noisy le Grand CEDEX, France, Fax: +33-1-45 92 66 99, Tel: +33-1-45 92 66 11, email: hamam@esiee.fr, http://www.esiee.fr/~hamamy

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Y. Hamam

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.

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ISCS

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 Address

For further information or application for membership, please contact:

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

Activities

On June 15, 1999 the annual conference of ISCS was held in Roma. The conference involved a plenary session with 20 contributed talks selected by the Scientific Committee composed of: G. Iazeolla, University of Rome "Tor Vergata" (Chairman); F. Maceri, University of Rome "Tor Vergata"; F. Cennamo, University of Naples; L. Donatiello, University of Bologna; P. Daponte, University of Naples; 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

The annual meeting of ISCS members has been held in Rome on the occasion of the ISCS'99 Conference.

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 email 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 the Italian simulation community, you are invited to send email messages to cortelle@info.uniroma2.it and they will be forwarded to all the addresses of the mailing list.

Events

On page 54 we include the Call for Papers of a special issue of Simulation Practice and Theory journal on Web-based Modeling and Simulation. Anybody working in this field is strongly invited to submit a manuscript.

V. Cortellessa

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 univer-sities, research institutes and industry in Poland with common interests in a variety of methods of computer simulations and its applications. At present PSCS counts 201 members. The board of second cadence consisting of the following persons directs the affairs of the PSCS:

Roman Bogacz - President
Leon Bobrowski - Vice President
Romuald Kotowski - Vice President
Zenon Sosnowski - Secretary
Zygmunt Strzyzakowski - Treasurer
Edward Kolodzinski, Bogdan Lesyng
Andrzej Tylikowski

Activity

The main activities of the Polish Society for Computer Simulation are the annual conferences known as "PSCS Workshops on Simulation in Research and Development". Prof. Leon Bobrowski in Wigry organized the third PSCS Workshop in 1996 and there were about 80 participants. The fourth and fifth PSCS Workshops were organized in 1997 and 1998 in Jelenia Gora.

Past Events

The **6th PSCS Workshop on Simulation in Research and Development** was held on August 25-27, 1999 in Bialystok and Bialowieza, Poland. The about 110 Polish participants attended the workshop with a few guests from Germany, Mexico, and New Zealand. Three parallel sessions with 72 regular papers and two plenary lectures of Prof. E. Raczynski and Prof. K. Pawlikowski covered the following areas: simulation methodology, 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. The workshop brought together a broad range of individuals in-

terested in methodology and applications of computers modeling and simulation. Two special sessions were in the main point of this year's PSCS Workshop. The celebration of the X-th Anniversary of the Computer Science Department at the Technical University of Bialystok marked by the first session, with four plenary lectures of Prof. O. Hryniewicz (IBS PAS), Prof. J. Madey (University of Warsaw), Prof. M. Niezgodka (ICM, University of Warsaw), and Prof. A. Salwicki (Technical University of Bialystok). The second session "Bio- and Ecosystems" took place in Bialowieza and was devoted mainly to modeling as a tool for solving of variety of the environmental problems. On the last day of the workshop 28 people attended the tutorial given by Prof. E. Raczynski.

Publications

Proceedings of the Fifth PSCS Workshop on "Simulation in Research and Development", R. Bogacz and A. Tylikowski (Eds.), Warsaw, 1999, ISBN 83-902146-2-8, (in Polish). The price is 20,- PLN.

Coming Events

Prof. Z. Strzyzakowski and Prof. E. Kolodzinski will organize the seventh PSCS Workshop on Simulation in Research and Development in September, 2000.

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Z. Sosnowski

ROMSIM

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.

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SIMS

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' matters are taken care of by the board, the ombudsman and the treasurer. SIMS' board has two members from each Nordic country. SIMS' annual meeting takes place at local conferences or in connection with international simulation conferences arranged in the Nordic countries.

How to join SIMS: You may register as a member of SIMS by sending your application with your personalia to the address: sims@vtt.fi. SIMS' members will receive information on simulation conferences, courses and other related events. SIMS' members will get discounted fees on conferences arranged by SIMS, EUROSIM or SCS, and subscriptions at discounted prices on the news journal *Simulation News Europe* and the scientific journal *Simulation Practice and Theory*.

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SLOSIM

Recent Activities

SLOSIM was one of the co-operative societies in the organization of the traditional **Electrotechnical and Computer Conference ERK'99** in Portoroz, Slovenia (Adriatic Coast). The conference took place from September 23 to 25, 1999. There were more than 200 papers presented.

The program consisted of 6 invited lectures, 35 conference sessions, 1 student session and several panel discussions.

The session part consisted of the following subjects: Electronics (3 sessions), Telecommunication (4), Automatic control (2), Simulation (2), Power engineering (4), Measurement (4), Computer science (5), Artificial intelligence (2), Pattern recognition (4), Biomedical engineering (3), Advances in engineering education (2). There was also one special student session.

SLOSIM was responsible for two simulation sessions which covered the following subjects: modelling and simulation of production systems, buildings, waste water treatment, military systems, batch neutralisation and some more theoretical subjects from the field of fault detection, identification, etc..

The next SLOSIM meeting is scheduled for November 25 at 16.00 at the Faculty of Pharmacy in the frame of Slovenian groups presentations.

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slosim@fe.uni-lj.si

B. Zupancic

In memoriam – France Bremšak (27. 10. 1923 – 16. 6. 1999)

Not long ago (in the March edition of SNE) we have reported about the election of prof. dr. France Bremšak for the first honorary member of SLOSIM. Prof. Bremšak can be considered as the beginner and pioneer in the field of modelling and simulation as well as automatic control in Slovenia. We were shocked by the news that we have lost our teacher, mentor, coworker and friend. Though he had an outstanding professional career in research and pedagogical sense he was primarily a very generous, kind, considerate and tolerant person who crucially influenced the life of several friends, colleagues and students. Therefore we will always remember our Professor with respect and gratitude.

R. Karba

UKSIM

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.

Workshop on Simulation

The UK Simulation Society is hosting a workshop/exhibition at University College London on Friday 29th October.

Simulation 99 will enable young researchers to present 10 minute papers and discuss their work on architectures, design, use, reliability, flexibility and management of simulations in an informal atmosphere. Common threads and innovative ideas that are cross-disciplinary should lead to lively interactions. Proceedings will be published.

Details can be obtained from Dr David Al-Dabass [email: dad@doc.ntu.ac.uk], and on the UKSim web site (http://www.doc.ntu.ac.uk/uksim/).

Future workshops are planned for next year.

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,

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Gary J. Gray

AES

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SCS Europe

1. About SCS and SCS Europe

SCS is the international, multidisciplinary forum dedicated to research, development, and applications of simulation. Since its founding in 1952, the Society for Computer Simulation's membership roster has been made up of engineers, scientists, managers, business professionals, students, and educators. A very diverse field whose interests include: artificial intelligence, microcomputers in simulation, methodology and validation, supercomputers, and more. In 1985 SCS International started a European Office at the University of Ghent, Belgium. In 1994 the SCS European Office was changed into SCS Europe BVBA, which now is the organisational and financial body behind the SCS European Council (established in 1991). SCS Europe BVBA also includes the SCS European Publishing House. SCS Europe BVBA organizes international scientific conferences on computer simulation and related fields. On a yearly basis, it takes care of the "European Simulation Multiconference" ESM, the "European Simulation Symposium" ESS, and two smaller conferences: the "European Concurrent Engineering Conference" (ECEC) and the "Scientific Conference on Web Technology, New Media, Communications and Telematics" EUROMEDIA. SCS Europe BVBA is also involved in the organization of local workshops. It should be stressed that all these activities are in close cooperation with the SCS European Council.

2. New Chair of SCS European Council

As already mentioned in SNE, number 26, July 1999, the SCS European Council has elected in its board meeting in Warsaw (June 1999) a new chair for a period of three years. The new chair is expected, among others, to

- improve the Council's infrastructure and set up better contacts between the Council's Board and the Council's members (SCS members residing in Europe);
- set up a Council's budget and prepare formal Board elections;
- cooperate with the Conference Board chair and the SCS Europe BVBA;
- take care of the Council's publicity and its relationships to other societies such as ASIM and the Federation of European Simulation Societies (EUROSIM).

Since at the appearance of the previous SNE the position had not yet been formally accepted by the new chair, his name could not be published. Therefore we herewith announce the name and coordinates of the European Council's new chair:
Prof. dr. Dietmar Moeller Universitaet Hamburg, FB Informatik Vogt-Koelln-Str. 30, D-22527 Hamburg, Germany, Tel.: +49-40 42883 2438; Fax: +49-40 42883 2206; email: Dietmar.Moeller@informatik.uni-hamburg.de

3. Appointed Conference Board Chair

As already mentioned in SNE, number 26, July 1999, the SCS European Council has elected in its Conference Board meeting in Warsaw (June 1999) a chair of the Conference Board. Among others, the Conference Board chair will coordinate, through the conference chair(s) and the BVBA, the organisation of the two major annual conferences ESM and ESS. Since at the appearance of the previous SNE the position had not yet been formally accepted by the new chair, his name could not be published. Therefore we herewith announce the name and coordinates of the Conference Board chair of the SCS European Council:
Professor Andrzej Bargiela, Chair of Simulation and Modelling, Department of Computing, The Nottingham Trent University, Burton Street, Nottingham, NG1 4BU, England, Tel.: +44-115 948 6016; Fax: +44-115 948 6518, email: andre@doc.ntu.ac.uk

4. A Foregoing SCS-related Event

Workshop: Harbour, Maritime & Logistics Modelling and Simulation. Genoa, Italy, 16-18 September 1999

The event was quite successful; there were about 60 papers and over 80 attendees. Also the exhibition was found to be pretty good with 6 exhibitors. The conference was divided in 5 tracks: Discrete Simulation for Harbour Logistics, Continuous Simulation for Chemical Logistics and Environment, Handling Systems for Logistics, Maritime Virtual Prototyping, Other Transportations and Multimodal Aspects. SCS Europe would like to thank the Steering Committee: A. Bruzzone, P. Giribone: General Chairs L.M. Gambardella, Y. Merkuryev: Program Chairs M. Nevins and R. Mosca: Conference Coordinators for the work they have done to make this event a success. The steering committee has decided to have the workshop annually (this was the second one in hopefully a successful series).

5. Coming SCS Events

- **ESS'99**, 11th European Simulation Symposium (Fourth ESS Conference devoted to Simulation in Industry), Erlangen (Germany), October 26-28, 1999.
- **ECEC'2000**, 7th European Concurrent Engineering Conference, Leicester (UK), April 17-19, 2000. The conference aim of ECEC'2000 is to provide a forum to European researchers, where they can discuss the latest developments linked to Concurrent Engineering focussed on European research projects.
- **Agent-Based Simulation**, workshop organised by SCS-Europe and ASIM on the occasion of prof. Bernd Schmidt's 60th birthday, Passau (Germany), May 2-3, 2000. Topics are: Basic Methodology; Agent-Architectures; Model-Specification and Languages; Mobile Agents; Multi-Agent Systems: Interactions and Communication; Micro-Macro Simulation and Emergent Behaviour; Decision Making and Strategies; Applications (in Biology, Behavioural Sciences, Social Systems and Artificial Societies, Economics and Market Systems, Business Process Management, Manufacturing Management, Cooperative Task Management, Medicine and Health Care, Computer Science, Agents in the Internet).
- **EUROMEDIA 2000**, Antwerp (Belgium), May 8-10, 2000. The fields covered at this conference include Web technology, multimedia, telecommunications, mobile computing, broadband networking, distributed computing, and telematics. Furthermore, this year EUROMEDIA will feature a special third day event called "Building a Global Business" and featuring a "Partners for Projects Session".
- **ESM'2000**, 14th European Simulation Multiconference, Ghent (Belgium), May 23-26, 2000. Topics covered are: Simulation in Supply Chain Management & Logistics; Simulation in Education & Corporate Training; Simulation in Biology, Medicine & Health Care Systems; Simulation in Industry and Services; Simulation Methodology, Tools and Standards; Simulation and Operations Research; Simulation in Control Engineering and Artificial Intelligence; Simulation in Communication and Networks.
- **FOODSIM'2000**, International Conference on Simulation in Food and Bio-Industries, Nantes (France), June 26-27, 2000. Tracks: Simulation in Food Engineering and Processing; Simulation in Food Sciences and Biotechnology; Simulation in Food Economics, Production and Logistics Management; Methods and Tools Applied to Food and Bio-Industries; Simulation and Training.
- **ESS'2000** will be held jointly with ASIM during the 3rd week of September 2000 in Hamburg (Germany). More information will follow in the next SNE.

For more details about coming SCS or SCS-related events, please have a look to our Website:
http://hobbes.rug.ac.be/~scs/

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6. SCS European Publishing House

As a part of SCS Europe BVBA, the SCS European Publishing House publishes high-quality scientific books on computer simulation and related fields. In the framework of an agreement between SCS Europe and ASIM our books in the series "Advances in Simulation" and "Frontiers in Simulation" are published as common products of the European Publishing House and Argesim; the chief editors of both series are: Prof. Felix Breitenecker, Prof. Gerald Kampe, Prof. Eugene J.H. Kerckhoffs, Prof. Axel Lehmann, Prof. Dietmar P.F. Moeller, Prof. Henri Pierreval, and Prof. Richard Zobel. For more information or to order books, please contact:

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or have a look to the above-mentioned SCS Europe BVBA Website.

The newest book (in German language) in the series "Frontiers in Simulation" (*Fortschritte in der Simulationstechnik*) is: Simulationstechnik, 13. Symposium in Weimar, September 1999, ISBN 1-56555-130-3, edited by prof. Georg Hohmann. There still are a number of books available; if you are interested, please contact Rainer Rimane.

P. Geril, E.J.H. Kerckhoffs, R. Rimane Executive Directors SCS Europe BVBA

Prof. dr. ir. Eugene J.H. Kerckhoffs, Technische Universiteit Delft, Fac.ITS /TWI, Zuidplantsoen 4, 2628 BZ Delft, The Netherlands, Tel : +31-15 278 1315, Fax: +31-15 278 7141, email: E.J.H.Kerckhoffs@ cs.tudelft.nl

International Societies

SIGSIM

General Information

The Special Interest Group for Simulation (SIGSIM) is an international professional organization in the area of modeling and computer simulation. The organization's members represent an extremely cross-disciplinary set of professions where modeling and simulation are applied. SIGSIM is actively involved in promoting technical advances in the field and supporting educational activities that expand the use of M&S in engineering, scientific, and management fields.

Regular Activities

SIGSIM is a cosponsor of the Winter Simulation Conference (WSC) and the Parallel and Distributed Simulation Workshop (PADS). Additional information on the WSC is available on the web at http://www.wintersim.org/

SIGSIM maintains a web page at http://www.acm.org/sigsim/ where current news, links to conferences, electronic publications, and special activities are maintained. SIGSIM also sponsors a mailing list for simulation professionals which is open to all interested parties. Instructions for subscribing to the mailing list are available on the web page.

Special Activities

SIGSIM has created a Web-Based Distinguished Lectureship Series. This consists of audio and video recordings of presentations by and interviews with some of the most prominent people in the field. The multimedia presentations will be accessible to SIGSIM members via the web page listed above. The first of these lectureships is an interview with Phil Kiviat, Sterling Software Inc., one of the early pioneers of discrete event simulation. This interview is now available via the web page in RealVideo format. The second lecture is a narrated slide presentation by Paul Fishwick, University of Florida, in RealMedia format.

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Membership

SIGSIM has approximately 700 members distributed among 50 countries around the world. Annual membership fees are $22 when accompanied by membership in ACM. Members receive the CD-ROM version of the *Proceedings of the Winter Simulation Conference*, the paper version of the *Proceedings of the Parallel and Distributed Simulation Workshop,* registration discounts on SIGSIM sponsored conferences, and access to the Distinguished Lectureship Series on the SIGSIM Web page. Additional membership information is available from:

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Roger Smith

IMACS

3rd MATHMOD Vienna

The international symposium on **Mathematical Modelling** will take place during February 2-4, 2000 at Technical University Vienna.

Scientists and engineers using or developing models or interested in the development or application of various modelling tools will find an opportunity to present ideas, methods and results and discuss their experiences or problems with experts of various areas of specialization.

Scope: All aspects of mathematical modelling of all types of systems, i. e., of systems which are dynamic or static, deterministic or stochastic, continuous or discrete, lumped parameter or distributed parameter, linear or nonlinear or of any other nature.

Consequently, a wide variety of formal models will be discussed and the term "mathematical model" will include classical models such as differential or difference equations, Markov processes, ARMA models as well as more recent approaches such as Bond graphs or Petri nets. The topics to be discussed will include modelling theory, processes and methods for model formulation, identification, development, reduction and validation etc. (incl. guidelines and check lists),

automation of modelling and software aids for modelling, computer modelling and modelling for/by simulation, qualitative modelling including fuzzy and iterative approaches to modelling, modular modelling (especially applied to interdisciplinary fields such as mechatronics or controlled environmental systems), learning networks in modelling, uncertainties in modelling, methodologies for model validation, fitting mathematical models to real processes, the relationship between the modelling approach and problem solutions, comparison of methods for modelling, model reduction and model validation, effects of modelling errors on overall performance of an engineering system (e. g. relationship between modelling and control design), applications in the field of engineering systems and in natural sciences, applications in other fields (such as environmental systems, biotechnology etc.), case studies of a comparison for ideas or methods, education in modelling.

Special Sessions: It is planned to have a poster session with parallel oral presentation of the posters. The poster abstracts will be published in a reviewed poster book (deadline for submission will be autumn).

Invited Lectures: Reverse Engineering in Modelling and Simulation (D.Murray-Smith, Univ. Glasgow), Modelling Dynamical Systems Using Manifest and Latent Variables (J.C. Willems, Univ. Groningen), Application of Computer Algebra Modelling, Soft Computing in Modelling and Simulation (St. Braun, Visual Analysis Munich), Retaining Analog Intuition in a Digital World with Bond Graphs (D. Karnopp, Univ. California Davis), Modelling for Fault Detection and Isolation versus Modelling for Control (P. M. Frank, Univ. Duisburg)

Venue: Vienna University of Technology, Vienna, Austria, Building "Freihaus", Wiedner Hauptstrasse 8-10, A-1040 Vienna

Proceedings of the Conference will be available at the begin of the conference (price included in Conference fee). It is also planned to have a poster session, whereby poster abstracts will be published in a reviewed poster book.

Presentations of software and a book exhibition will be organized. The social program will include a Welcome Party, a Heurigen Evening and a Reception (included in conference fee).

Conference Fees: Members of IMACS and cosponsoring societies Euro 300.-; Non-Members Euro 330.-; Students Euro 70.-; Accompanying Persons Euro 90.-.

Organizer: Division for Mathematics of Control and Simulation (E114/5) at Vienna University of Technology.
Chair of IPC: Prof. Dr. Inge Troch.

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Comparison 12: Collision Processes in Rows of Spheres

This comparison deals with a model of the mechanics. The features to be compared represent a large number of events, the numerical accuracy, the iteration of a boundary value, and stochastic parameter variations. Piecewise, constant velocities permit both a continuous and a discrete treatment.

Subject of the investigation are sequences of collisions, caused by the impact of a sphere on a resting row of spheres. In the elastic case only one impact occurs between neighbouring spheres, whereas one can observe many interactions if elasticity decreases. Numerical problems result from the peculiarity, that the relative distances and velocities at a low elasticity can be smaller by orders of magnitude than the absolute variables. In order to avoid small faulty differences of great values, the relative quantities are used as variables, and absolute quantities are obtained by summation.

Partially elastic collision of two masses

The collision shall take place at $t = 0$ with the velocities v_1, v_2 (Figure 1a). The force $F(t)$ being exerted from both masses on each other, rises first with t and reaches its maximum at $t = t^*$ (Figure 1b). In this compression phase, the bodies are increasingly deformed in the immediate vicinity of the contact place. At the end (maximum deformation) both bodies have the same velocity v^*. In the following restitution period the deformations disappear partially

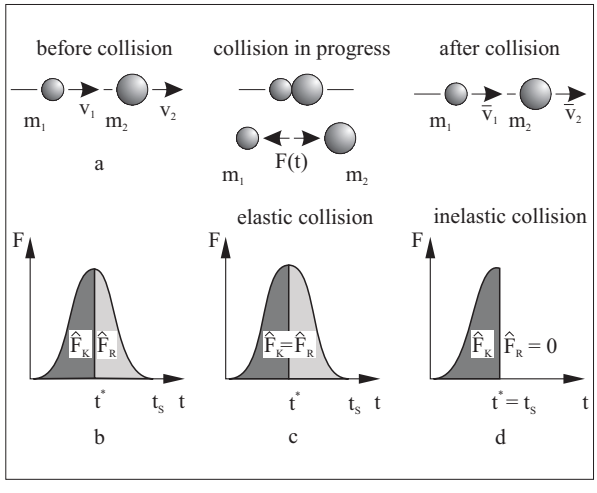

Figure 1: Central impact of two masses

or completely, concurring with a reduction of the contact force $F(t)$. After the time interval t_S the collision process is finished and both masses move with velocities $\bar{v}_1$ and $\bar{v}_2$, respectively.

The force impulses $\hat{F}_K$ and $\hat{F}_R$, exerted during both periods, determine the momentum change. They are represented by the areas below the force curve $F(t)$. The force impulse in the restitution phase reaches at most the value of the compression phase:

$$\hat{F}_R = e\hat{F}_K, \text{ with } 0 \le e \le 1 . \qquad (1)$$

e restitution coefficient (collision coefficient)

An elastic impact has the collision coefficient $e = 1$, whereas an inelastic collision is known to have no restitution phase ($e = 0$). In general, partially elastic case the collision coefficient takes on values of $0 < e < 1$. Using the momentum conservation law, the new velocities in the next period of time follow this piecewise description:

$$\bar{v}_1 = v_1 - (1+e)\frac{m_2}{m_1+m_2}(v_1 - v_2)$$
$$\bar{v}_2 = v_2 + (1+e)\frac{m_1}{m_1+m_2}(v_1 - v_2) \qquad (2)$$

After the limiting process of the collision time $t_S \to 0$, the impact shall be modelled in the following as a state event that takes place immediately.

Mathematical model of a spheres row

In order to obtain an ideal translation, the p spheres arranged in a row are tied up with infinite long threads without any friction (Figure 2). The model consists of $p = 4$ spheres;

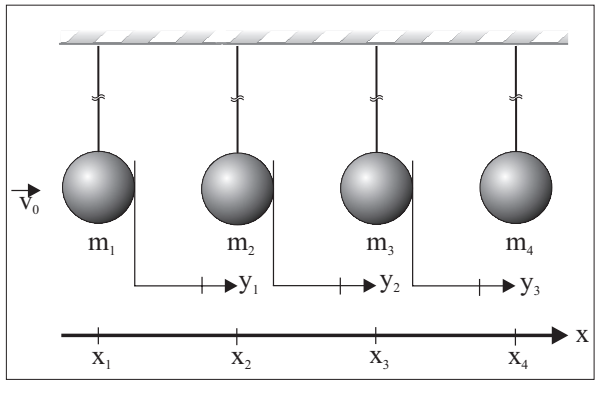

Figure 2: Collision pendulum of four spheres

for all collisions e takes on a constant value that does not depend on the velocities. A further precondition is the equality of the diameters d for all spheres, their masses m_i and distances a from each other.

In the model description the relative quantities are variables:

$$y_1 = x_2 - x_1 - d,\ y_2 = x_3 - x_2 - d,\ y_3 = x_4 - x_3 - d,$$
$$\dot{y}_1 = \dot{x}_2 - \dot{x}_1, \dot{y}_2 = \dot{x}_3 - \dot{x}_2, \dot{y}_3 = \dot{x}_4 - \dot{x}_3. \qquad (3)$$

For determination of the remaining absolute quantities by summation equations of motion for the inner distances y_i (i=1,2,3) and the absolute variable x_1 are needed. The initial conditions are chosen so that sphere 1 strikes the motionless other three spheres with velocity v_0. An influence of external forces is not considered.

Equations of motion

$$\ddot{x}_1 = 0 \quad \dot{x}_1(0) = v_0, \quad x_1(0) = 0,$$
$$\ddot{y}_1 = 0 \quad \dot{y}_1(0) = -v_0, \quad y_1(0) = a,$$
$$\ddot{y}_2 = 0 \quad \dot{y}_2(0) = 0, \quad y_2(0) = a,$$
$$\ddot{y}_3 = 0 \quad \dot{y}_3(0) = 0, \quad y_3(0) = a \qquad (4)$$

Absolute quantities

$$x_2 = x_1 + y_1 + d, x_3 = x_2 + y_2 + d, x_4 = x_3 + y_3 + d$$
$$\dot{x}_2 = \dot{x}_1 + \dot{y}_1, \dot{x}_3 = \dot{x}_2 + \dot{y}_2, \dot{x}_4 = \dot{x}_3 + \dot{y}_3 \qquad (5)$$

The expressions on the right side of equations (6) describing the velocities after a collision contain the relative velocities at the moment of impact as derivatives of the distance variables y_i, that determine the time of collision.

Collision 1-2

$$\dot{x}_1 = \dot{x}_1 + (1+e)\cdot m_2 / (m_1 + m_2)\cdot \dot{y}_1$$
$$\dot{y}_2 = \dot{y}_2 + (1+e)\cdot m_1 / (m_1 + m_2)\cdot \dot{y}_1 \qquad (6a)$$
$$\dot{y}_1 = -e\cdot \dot{y}_1$$

Collision 2-3

$$\dot{y}_1 = \dot{y}_1 + (1+e)\cdot m_3 / (m_2 + m_3)\cdot \dot{y}_2$$
$$\dot{y}_3 = \dot{y}_3 + (1+e)\cdot m_2 / (m_2 + m_3)\cdot \dot{y}_2 \qquad (6b)$$
$$\dot{y}_2 = -e\cdot \dot{y}_2$$

Collision 3-4

$$\dot{y}_2 = \dot{y}_2 + (1+e)\cdot m_4 / (m_3 + m_4)\cdot \dot{y}_3 \qquad (6c)$$
$$\dot{y}_3 = -e\cdot \dot{y}_3$$

Insignificant or positive relative velocities $(\dot{y}_1 \geq 0) \wedge (\dot{y}_2 \geq 0) \wedge (\dot{y}_3 \geq 0)$, i.e., monotonously increasing absolute velocities, establish the termination criterion for a simulation run, that is, no further collisions will occur and the velocities will not change.

Tasks

Task a)

a1) Graphical representation of the distance-time functions $y_1(t)$, $y_2(t)$ and $y_3(t)$ for parameter values e = 0.2, d = 1 and initial values a = 1, v_0 = 1 in time interval $0 \leq t \leq 15$ (termination criterion met). Initial values and sphere diameter d remain valid in the following.

a2) Final values of the velocities for e = 1 (elastic case) and for the quasi-plastic case in which velocities are sufficiently equal.

Task b)

b1) Number of collisions as a function of the restitution coefficient $n(e)$ which should be varied from e = 1 to a value for which the quasi-plastic case is reached.

b2) Graphical representation of the final velocities $\dot{x}_1$, $\dot{x}_2$, $\dot{x}_3$ and $\dot{x}_4$ as a function of values of e for $e \leq 1$ up to the quasi-plastic case.

Task c)

c1) As a boundary value problem the restitution coefficient e is to be determined such that the final velocity be $v_4 = v_0/2$.

c2) The restitution coefficient e, which is equal for all spheres, is now a normally distributed stochastic variate with mean value m = 0,5 and standard deviation s = 0,05. The distribution function of v_4, mean value, standard deviation and confidence interval with confidence probability of 95% for a sufficiently large sample size are to be determined.

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Comparison 12 – ACSL
Hybrid Approach

The Simulator: ACSL is a simulator oriented on the continuous CSSL standard. In the problem observed hereunder, the features for treating state events (hybrid approach), the vector integration and the inclusion of user routines are relevant.

Model description: The distance/time and the velocity/time functions are calculated piecewise. The time periods are interrelated by fitting conditions. Every time two iteratively determined collision events form the integration boundaries for one interval. The ACSL model comprises the movement equations, the fitting conditions for the velocities in three DISCRETE sections as well as routines in the TERMINAL section for a variation in the collision coefficient, for iteration of the boundary conditions, and for generating an output file of stochastic values. All routines use iteration loops with returns to the INITIAL section. Because of the discontinuously varying velocities, the LOGD calls in the DISCRETE sections register variables both prior to the collision and after the model update with the ZZDERV(1) call. Simultaneously, the number of collisions is summed up. All computation was carried out with double precision. The conservation of the overall momentum can be used as a criterion for correctly representing the mechanics.

Results task a: The distance/time functions in Figure 1 of task a1 show that spheres of little elasticity approach each other closely. The final velocities in task a2 with $e = 1$ are $\dot{x}_1 = \dot{x}_2 = \dot{x}_3 = 0$ and $\dot{x}_4 = 1$. With e being 0.18 they equal $\dot{x}_1 = \dot{x}_2 = \dot{x}_3 = \dot{x}_4 = 0.250000$ practically (quasi plastic), which holds strictly for $e = 0$ only.

Results task b: Characteristic for task b1 are both the large number of interactions and their sharp rise with small impact values of $e < 0.2$ in the logarithmic scheme in Figure 2. Selected value pairs (e,n): (1;3), (0.5;6), (0.25;10), (0.22;9), (0.2;13), (0.18;25), (0.175;40), (0.172;115), (0.1715;567) and the maximum n achieved (0.171577;1151). The function curve does not rise monotonously all the time. The representation of the final velocities vector v in Figure 3 shows the con-tinuous transition from the elastic to the quasi plastic case of task b2.

Results task c: A Newton method with the allocations $f := v_4\text{-}v_0 /2$ and e being the independent variable iterates the solution of task c1 ($e = 0.587401$) as zero of f by BLOCK-IF instructions. The integer variable i controls the change between the calculation of derivation fp and a new collision coefficient e.

```
Newton Iteration - Selected Sequences
CONSTANT vend=0.5, eps=1E-6, de=0.01
INITIAL
i = 0
e = 0.9
1..CONTINUE
END ! of Initial
deltav = x4d-vend ! function f
b = (y1d .GE. 0.) .AND. (y2d .GE. 0.)&
.AND. (y3d .GE. 0.) ! termination criterion
TERMT(b)
TERMINAL
IF(i .EQ. 0) THEN ! write final values
OPEN(6, File='DATEN.DAT')
                    WRITE(6, 2) e, x4d
                    2..FORMAT(1X,'e:',F8.6,3X,'x4d:',F8.6)
                    IF(ABS(deltav) .GT. eps*vend) THEN
                    e_old = e ! new restitution coefficient
                    f_old = deltav
                    e = e_old+de ! derivative fp
                    (f_prime)
                    i = 1
                    GOTO 1
                    ENDIF
                    ELSE
                    f = deltav
                    fp = (f-f_old)/de
                    e = e_old-f_old/fp ! Newton method
                    i = 0
                    GOTO 1
                    ENDIF
                    CLOSE(UNIT=6)
                    END ! of Terminal

                    Iteration steps:
                    e: 0.900000   x4d: 0.857375
                    e: 0.637396   x4d: 0.548745
                    e: 0.589207   x4d: 0.501708
                    e: 0.587414   x4d: 0.500013
                    e: 0.587401   x4d: 0.500000
```

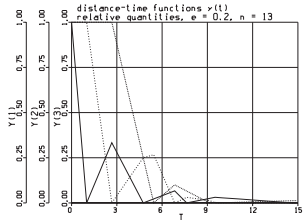

Figure 1: y_1 (solid), y_2 (dashed), y_3 (dotted)

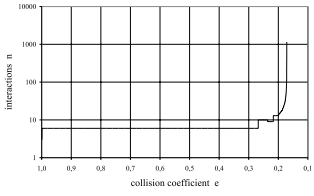

Figure 2: Number of collisions $n(e)$

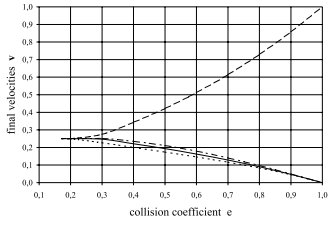

Figure 3: Final velocities v(e)

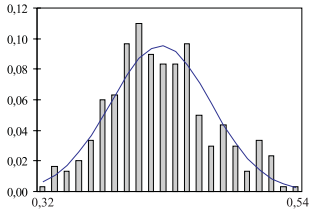

Figure 4: Frequency comparison

A frequency comparison of the simulation data with the density of the MLE-fitted $N(0{,}423;0{,}0417)$ distribution is depicted in Figure 4. N_j / n represents the fraction of the observed values of task c2 that would fall in the jth interval while p_j indicates the corresponding proportion of values sampled from the fitted distribution. For evaluating the *goodness of fit* a χ^2-test has been carried out with the data now grouped into $k = 20$ intervals. We could not reject our distribution hypothesis at the $\alpha = 0{,}10$ level. Obtained statistical parameters are: $\bar{v}_4 = 0.423$, $s = 0.0418$, KONF$\{0.418 \le \mu \le 0.428\}$ with $n = 300$ samples from the GAUSS(m, s) function.

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Comparison 12 – MATLAB/SIMULINK

Continuous Approach – State Events

MATLAB is a widely used software tool based on numerical vector and matrix manipulation. SIMULINK is a continuous simulator with a graphical user-interface, embedded in the MATLAB environment.

Model description: MATLAB provides the speed and the positions of the balls, then calling a SIMULINK model (fig. 1) that runs as far as the next hit (state event). The calculations at the hit are done in MATLAB, which then starts the model again, until finally all relative speeds are positive.

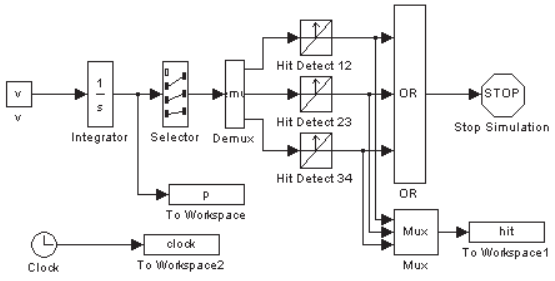

fig. 1: SIMULINK model

Task a

1. Relative positions were only stored at each hit event (fig. 2). This makes sense, because the functions are linear between hits. Finally the spheres move with nearly no distance.
2. `e=1: v=0; 0; 0; 1`
   `e=0.171577: v= 0.25; 0.25; 0.25; 0.25`
   `0.171577` was the smallest value of `e` to be used for simulation. Smaller values would result in never-ending simulation runs.

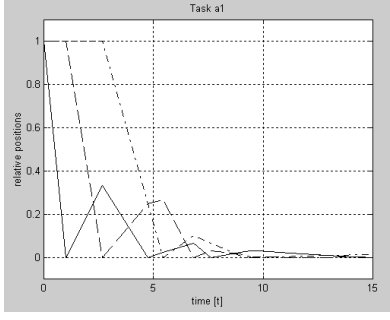

fig. 2: Task a1

Task b: Simulation runs were performed for values of e from 1 to 0.171577. The final speeds behave like expected, but the tremendous increase in hits is interesting. This is what makes solving the system a numerical problem for small values of e.

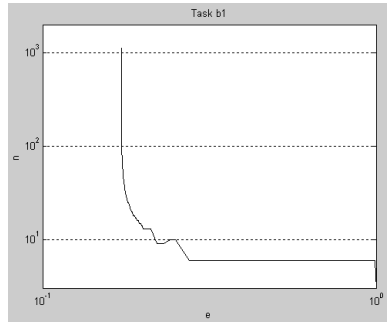

fig. 3: Task b1

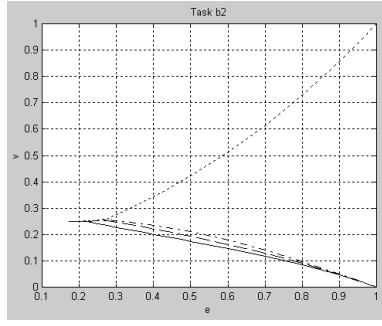

fig. 4: Task b2

Task c: The solutions for this task were generated by means of built-in MATLAB functions.

1. e = 0.5865 gives $v_4 = 0.4991$
2. mean: 0.4214
   std. deviation: 0.03973
   95% confidence interval: [0.3449; 0.5004]
   Although the histogram (Fig. 5) looks very similar to a normal distribution, it is clearly nonsymmetric, which is why the confidence interval is also nonsymmetric.

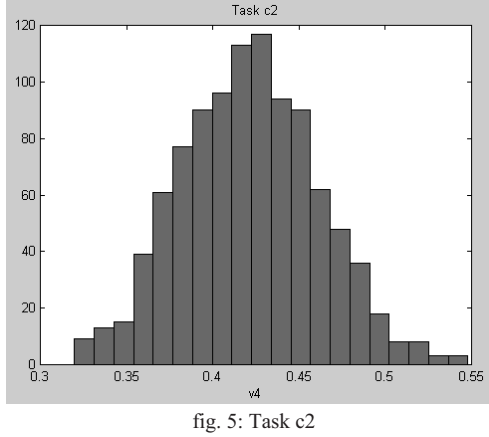

fig. 5: Task c2

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Comparison 3 – MATLAB

Dynamic function approach

MATLAB, a wide-spread scientific computing package, allows this solution by means of basic MATLAB features and commands (without toolboxes etc.).

Model description: The differential equation describing the model was implemented in state space form: $dx/dt = A*x$, $x \in R^3$, $A \in R^{3*3}$, with time dependent matrix $A = A(R(t))$. The resistivity $R(t)$ and the explicit differential equation are represented by function-type `m`-files. The time-dependent resistivity $R(t)$ was implemented as a continuous function. In the following these m-file models (`A.m, R.m, dgl.m`)

```
function A_out=A(t)
global VDC L1 C2 L3 C4 RL TRF
A_out=[0 -1/L1 0 0 ; 1/C2 -1/(C2*R(t)) -1/C2 0;
0 1/L3 -RL/L3 -1/L3 ; 0 0 1/C4 0];
end

function R_out=R(t)
global TRF
k=((5e6)-(5e-2))/TRF;
t_red=MOD(t,(1e-5));
if (0<=t_red)&(t_red<TRF);
R_out=(5e-2)+k*t_red;
eIseif (TRF<=t_red)&(t_red<(5e-6))
R_out=5e6;
eIseif ((5e-6)<=t_red)&(t_red<((5e-6)+TRF))
R_out=(5e6)-k*(t_red-(5e-6));
eIseif (((5e-6)+TRF)<=t_red)&(t_red<(1e-5))
R_out=5e-2;
end

function dx=dgl(t,x)
global VDC L1 C2 L3 C4 RL TRF
 b=[VDC/L1 0 0 0];
 dx=A(t)*x+b;
end
```

Task a: The MATLAB command `eig(.)` is used to calculate the eigenvalues of $A(t)$ at two different time instants, once during the on-period and once during the off-period of the almost rectangular function $R(t)$:

```
R_off=eig(A(0)); R_on=eig(A(TRF))
```

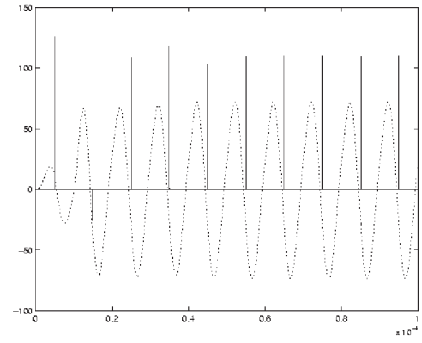
Eigenvalues off-period	Eigenvalues on-period
-5.4708e+004 +1.0408e+006i	-1.1173e+009
-5.4708e+004 -1.0408e+006i	-6.2578e+002
-5.8228e+004 +5.3275e+005i	-1.1304e+005 +6.5835e+005i
-5.8228e+004 -5.3275e+005i	1.1304e+005 -6.5835e+005i

These results show that the system is (partially) very stiff.

Task b: To simulate the stiff system a gear-type solver for stiff systems is used: `ode23(.)`. The final solution of the states at $t = 10^{-5}$ is stored for later use:

```
[t_sol,x_sol]=ode23s(dgl,[0 10e-5],[0;0;0;0]);
```

The results are shown in the following picture (Current $IR(t) = x_2/R(t)$ [-,in A] and voltage $VL = x_3*RL$ [.,in 0.1V]:

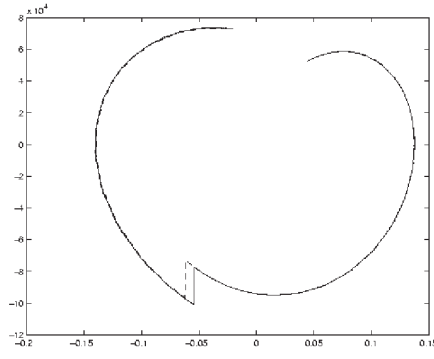


Task c: Using as new initial value the final values of the foregoing calculations (stored as last value in the solution vector `x_sol`), simulation using `ode23(.)` was repeated four times, varying the rise/fall time TRF and storing all results.

```
init=x_sol(length(t_sol),:);
TRF=(1e-15);
 [t_sol_1,x_sol_1]=ode23s(dgl,[0 9e-6],init);
 x3p_1=1/L3*(x_sol_1(:,2)-RL*x_sol_1(:,3)
       -x_sol_1(:,4));
TRF=(1e-11);
 [t_sol_2,x_sol_2]=ode23s(dgl,[0 9e-6],init);
 x3p_2=1/L3*(x_sol_2(:,2)-RL*x_sol_2(:,3)
       -x_sol_2(:,4));
TRF=(1e-9);
 [t_sol_3,x_sol_3]=ode23s(dgl,[0 9e-6],init);
 x3p_3=1/L3*(x_sol_3(:,2)
       -RL*x_sol_3(:,3)-x_sol_3(:,4));
TRF=(1e-7);
 [t_sol_4,x_sol_4]=ode23s(dgl,[0 9e-6],init);
 x3p_4=1/L3*(x_sol_4(:,2)-RL*x_sol_4(:,3)
       -x_sol_4(:,4));
```

The results are stored separately in vectors `x3p_1`, `x3p_1`, `x3p_1`, `x3p_1` in order to compare exactly the changes – no differences occur for $TRF=10^{-15}$, 10^{-11} and 10^{-9}, only the result for $TRF=10^{-7}$ differs slightly at the switching time instants.

A plot in the phase plane ($VL3 = dx_3/dt$ as a function of $IL3 = x_3$) – using the stored results – shows this difference (dashed line $TRF=10^{-7}$, other solution coincide):



All calculations were performed on a AMD-K62 400 under Windows 95 and Matlab 5.1. The executing of the whole script took about 20 seconds, including graphic outputs.

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Comparison 9 – MATLAB

Discrete Model / Algorithmic Control

MATLAB is a widely used software tool based on numerical vector and matrix manipulation.

Model description: Fuzzy controllers that are implemented as algorithms invoke a lot of time consuming calculations. Some commercial software packages try to minimise this computation time by pre-calculation of a multidimensional table-function which is evaluated at runtime, others by descretisation of the membership functions for in- and output. Both approaches induce errors. The solution presented here provides all needed calculations explicitly in `m-functions`, no predefined (table lookup, fuzzy tools) just basic MATLAB functions are used.

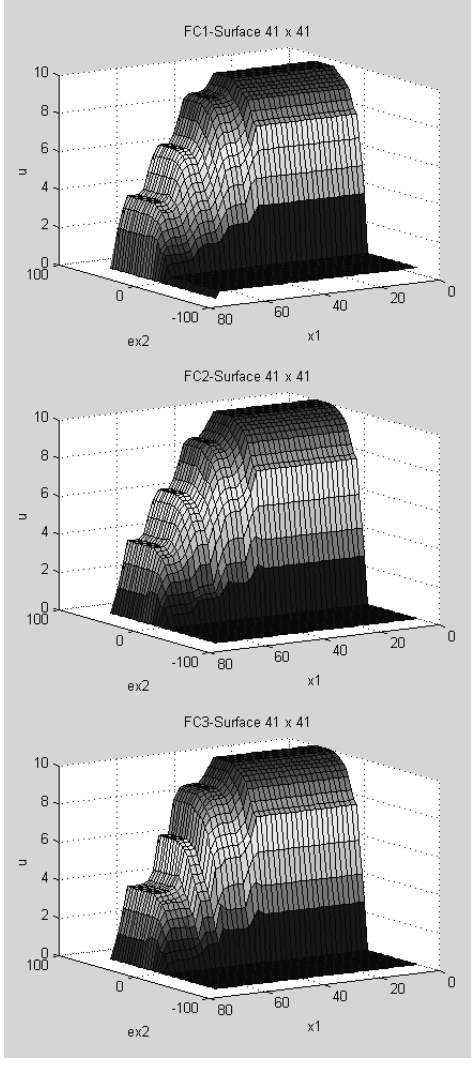

Fig. 1: Characteristics of Controllers

The membership functions are implemented as piecewise linear functions which are evaluated for fuzzyfication. Inference is done by applying the min and max function. Intersections of eventually overlapping membership functions are detected so that the area for defuzzyfiction can be given precisely. The resulting output variable is again a piecewise linear function which is integrated algebraically for Center Of Gravity defuzzyfication. Up to this point just rounding errors might occur, there are no descretisation errors.
Singletons are not emulated but handled separately which gives a more simple and less time-consuming algorithm for FC2.
For task b) simulation of the dynamic system is done by a simple Euler-Integration with timestep h=1ms. So the system may be interpreted as a discrete system (explicitly programmed Euler step).

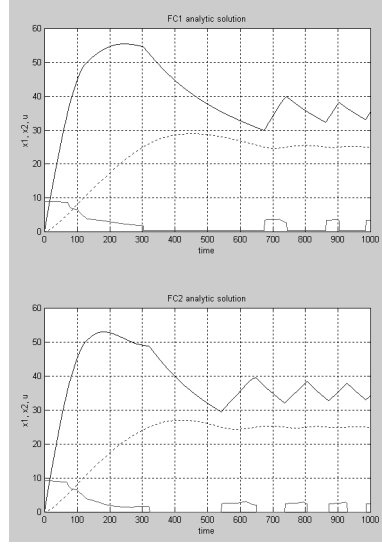

Fig. 2: x1, x2 and u versus time for FC1 and FC2

All computations were done on a Pentium II 400, 128 MB, Windows NT 4.0 and MATLAB 5.3 were used.

Results task a: Fig. 1 shows the 3D Characteristics for FC1, FC2 and FC3. The computation times were: ta_{fc1}=19.6 sec, ta_{fc2}=8.3 sec, r = ta_{fc1}/ta_{fc2}=2.4.

Results task b: Fig. 2 shows the behaviour of the Two Tank System with controllers FC1 and FC2. The computation times were: tb_{fc1}=12.6 sec, tb_{fc2}=5.8 sec, r = tb_{fc1}/tb_{fc2}=2.2 sec.

Results task c: The third surface in Fig. 1 shows the characteristic of controller FC3. The computation time was: tc_{fc3}= 8.3 sec.

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Comparison 9 – DORA 6.2

Continuous Model / Data Model Control

DORA for Windows is a block-oriented tool for both linear and non-linear system analysis and simulation with emphasis on fuzzy control. In its current version 6.2, it provides (among others) an easily programmable graphical modelling environment, a number of block libraries with standard blocks for discrete and continuous simulation, implementations of various new patented fuzzy strategies, a full online help system, and (with appropriate AD/DA-hardware) the possibility of realtime control. The functionality can be extended by importing any model description in DLL form.

Task a: (a1) The fuzzy module included within DORA for Windows features a dialog-based choice of the fuzzy parameters, graphical and numerical editing of the membership functions, a table- and matrix-based rule editor, 3D-surface plot and contour lines, plot of characteristics, export facilities to various fuzzy languages, and a C-source-code generator.

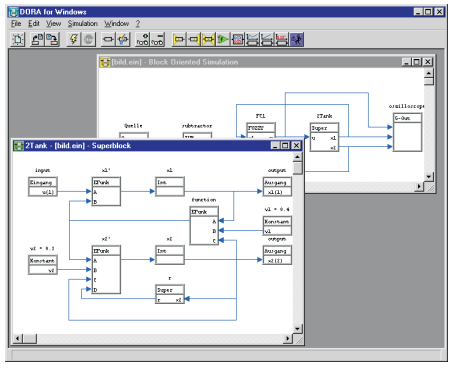

Figure 1: The two-tank system

The model of the two-tank system is built up with standard blocks which are suitably combined in superblocks (Fig.1). The model of the fuzzy controller is implemented with the *DORA Fuzzy module* which is accessible as a common block from the non-linear systems block library. As the membership functions are restricted to trapezoidal shape the singletons for FC2 can be built up with all vertices set to one value.

(a2) The computation and visualization of the 3D-surface (Fig.2) is done with the built-in *family of characteristics* utility. The computation time on a Pentium 120 MHz machine with 32 MB RAM is ta_{FC1} = 7.14 sec.

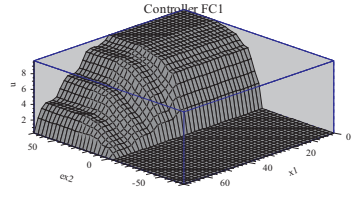

Figure 2: Characteristic surface of controller FC1

(a3) The computation time for FC2 is ta_{FC2} = 7.02 sec. Thus, the ratio is ta_{FC1}/ta_{FC2} = 1.017.

Task b: (b1) Visualized with the *oscilloscope module* the computation time of the simulation is tb_{FC1} = 2.38 sec (Fig.3).

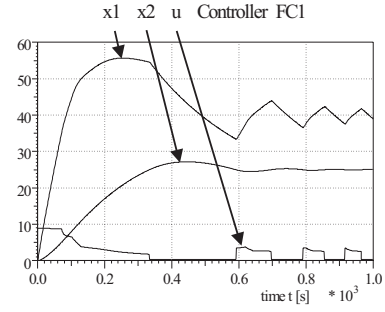

Figure 3: Simulation with FC1

(b2) The computation time with singletons is tb_{FC1} = 2.13 sec (Fig.4). The ratio is 1.117.

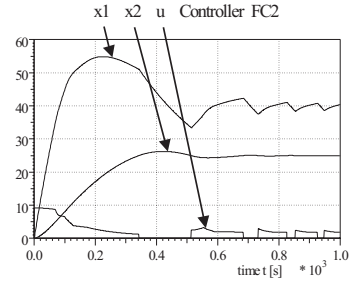

Figure 4: Simulation with FC2

Task c: (c1) The computation time of the 3D-plot with *weighted rules* is tc_{FC3} = 7.06 sec. Weights can be easily incorporated using the table-based rule editor. Here, each rule can be weighted individually.

(c2) Developed at the *Chair of Electrical Control Engineering* at the University of Dortmund, DORA for Windows offers features which result from the chair's most recent research. Most outstanding, the tool is able to process not only positive but also negative rules (which express warnings or vetoes) using *hyperinference* and *hyperdefuzzification*. With the *inference filter* it is possible to change continuously between defuzzi- fication strategies which offers more degrees of freedom for an efficient optimization. Furthermore, DORA for Windows is an interface to Winrosa, the chair's tool for data-based generation and evaluation of positive and negative fuzzy-rules.

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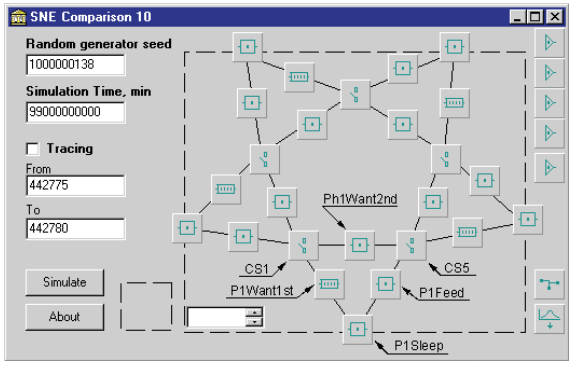
Comparison 10 – DELSI

Discrete Event Model / Local Control

The solution for Comparison 10 is developed with help of the discrete-event simulation system Delsi 1.0, by Softland, 1998-1999. *Delsi* is a set of components for Borland Delphi intended for simulation of queuing systems. Based on Borland Delphi, Delsi is completely object-oriented event-driven simulation system. The queuing units like generator, queue, server, etc. are implemented as components and transactions are implemented as objects. More information about Delsi is available at http://www.softland.rv.ua/delsi.htm.

The structure of the model is similar to the Delsi solution of Comparison 4 (See SNE #26, p39). It is shown in the design-time form in the figure. In order to satisfy demands of Comparison 10 we have replaced the queues *P1Want2nd* - *P5Want2nd* with servers *Ph1 Want2nd* - *Ph5Want2nd* with zero service time. The reason of this replacement is to guarantee the rule of simultaneous access resolving. In contrast to Comparison 4, all deadlock avoiding logic is omitted.



As in Comparison 4, for logic description we consider one philosopher (on the bottom of the scheme). So, after initial meditation in *P1Sleep* the philosopher waits for the left stick in the queue *P1Want1st*. If the stick is free the philosopher immediately seizes it. In this model the sticks are implemented as *TGate* components. The left stick of the first philosopher is named *CS1*. After the transaction entering to *CS1* we lock this gate to avoid its seizing by another philosopher. When exiting *CS1* we need to identify the transaction, because two philosophers may use the same stick. We route transaction using its ID, in our case, to wait for the server *Ph1Want2nd* with zero service time. This artificial trick guarantees the correct resolving of simultaneous access collision, i.e. right neighbor has pre-ference. If right stick (*CS5*) is free, philosopher immediately seizes it. Using transaction's ID we route it to the server *P1Feed* (feeding). After feeding we unlock both *CS1* and *CS5* and route transaction to the server P1Sleep for meditation. Here the basic cycle is completed.

The following table shows sticks utilization

Stick1	Stick2	Stick3	Stick4	Stick5	Overall
0,914	0,911	0,911	0,915	0,915	0,913

Delsi suggests very flexible opportunities for simulation tracing. The user can build the tracing output of any form. The following part of tracing log demonstrates both simultaneous access resolution (the conflict between 4th and 5th philosophers) and deadlock genesis. We have added our comments to the tracing log.

```
Time: 49120     ID=5      P5Sleep -> P5Want1st
Time: 49120     ID=5      P5Want1st -> CS5
   // 5th philosopher seizes his left stick
Time: 49120     ID=5      CS5 -> Ph5Want2nd
   // 5th philosopher goes to 0-time server
Time: 49120     ID=3      P3Sleep -> P3Want1st
Time: 49120     ID=3      P3Want1st -> CS3
Time: 49120     ID=3      CS3 -> Ph3Want2nd
Time: 49120     ID=1      P1Sleep -> P1Want1st
Time: 49120     ID=1      P1Want1st -> CS1
Time: 49120     ID=1      CS1 -> Ph1Want2nd
Time: 49120     ID=4      P4Sleep -> P4Want1st
Time: 49120     ID=4      P4Want1st -> CS4
   // 4th philosopher seizes his left stick
Time: 49120     ID=4      CS4 -> Ph4Want2nd
Time: 49120     ID=2      P2Sleep -> P2Want1st
Time: 49120     ID=2      P2Want1st -> CS2
Time: 49120     ID=2      CS2 -> Ph2Want2nd
   // the final event before deadlock
```

The time movement in *Delsi* is implemented by the maintenance of the List of Future Events (LFE), which is ordered by event time. The entries with the same time are ordered in accordance with FIFO techniques. *Delsi* simulation engine automatically detects a deadlock in simulated system. Deadlock in Delsi means that the LFE is empty.

We have performed 50 runs using PMMCG random generator with multiplier 950706376 and seeds in the range of [1000000100…1000000149]. The minimal and maximal time of deadlock are 24439 and 11274268 correspondingly.

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Result task i): The following table shows the results (deadlock at t=49120)

	Meditation time		Waiting for 1st stick		Waiting for 2nd stick		Eating time	
	Mean	Stdev	Mean	Stdev	Mean	Stdev	Mean	Stdev
1	5,596	2,869	1,783	2,426	9,155	7,487	5,420	2,845
2	5,493	2,877	1,862	2,491	8,980	7,482	5,455	2,891
3	5,571	2,869	1,770	2,439	9,039	7,502	5,419	2,892
4	5,557	2,863	1,742	2,395	9,095	7,525	5,415	2,914
5	5,480	2,878	1,747	2,372	9,142	7,519	5,440	2,866
All	5,539	2,871	1,781	2,425	9,155	7,503	5,430	2,882

BISC – Berkeley Initiative in Soft Computing

A bit of history:

BISC is an acronym for the Berkeley Initiative in Soft Computing. As an idea, BISC was conceived in October 1990, and developed in close consultation with Dean David Hodges, EECS Chair Paul Gray, CS Associate Chair David Patterson and Director for College Relations Marily Howekamp. The launching of BISC was announced on March 13 at the 1991 ILP (Industrial Liaison Program) Conference in Berkeley. Since then, BISC has evolved into a worldwide, email-linked community of individuals and organizations that share interest in soft computing and its applications.

What is soft computing?

Soft computing differs from conventional (hard) computing in that, unlike hard computing, it is tolerant of imprecision, uncertainty and partial truth. In effect, the role model for soft computing is the human mind. The guiding principle of soft computing is: Exploit the tolerance for imprecision, uncertainty and partial truth to achieve tractability, robustness and low solution cost. The basic ideas underlying soft computing in its current incarnation have links to many earlier influences. The inclusion of neural network theory in soft computing came at a later point. At this juncture, the principal constituents of soft computing (SC) are fuzzy logic (FL), neural network theory (NN) and probabilistic reasoning (PR), with the latter subsuming belief networks, genetic algorithms, chaos theory and parts of learning theory. What is important to note is that SC is not a melange of FL, NN and PR. Rather, it is a partnership in which each of the partners contributes a distinct methodology for addressing problems in its domain. In this perspective, the principal contributions of FL, NN and PR are complementary rather than competitive.

Implications of soft computing

The complementarity of FL, NN and PR has an important consequence: in many cases a problem can be solved most effectively by using FL, NN and PR in combination rather than exclusively. A striking example of a particularly effective combination is what has come to be known as neurofuzzy systems. Such systems are becoming increasingly visible as consumer products ranging from air conditioners and washing machines to photocopiers and camcorders. Less visible but perhaps even more important are neurofuzzy systems in industrial applications.

What is particularly significant is that in both consumer products and industrial systems, the employment of soft computing techniques leads to systems which have high MIQ (Machine Intelligence Quotient). In large measure, it is the high MIQ of SC-based systems that accounts for the rapid growth in the number and variety of applications of soft computing - and especially fuzzy logic.

The conceptual structure of soft computing suggests that students should be trained not just in neural network theory or fuzzy logic or probabilistic reasoning but in all of the associated methodologies, though not necessarily to the same degree. This is the principle which guides the BISC Seminar on Soft Computing and the course Fuzzy Logic, Neural Networks and Soft Computing which I teach at present. The same applies to journals, books and conferences. We are beginning to see the appearance of journals and books with soft computing in their title. A similar trend is visible in the titles of conferences.

Current status of BISC

At present, the BISC Group - as the community is called - comprises close to 600 students, professors, employees of private and non-private organizations and, more generally, individuals who have interest or are active in soft computing or related areas. A category which was initiated recently is that of the Institutional Affiliates, which applies to universities, laboratories and non-profit organizations. Currently, BISC has over 50 Institutional Affiliates, with their ranks continuing to grow in number. The only qualification for membership in BISC is interest in soft computing. A recent BISC project aims at a compilation of references centering on various application areas. Some current areas are:

Application of soft computing to handwriting recognition
Application of soft computing to automotive systems and manufacturing
Application of soft computing to image processing and data compression
Application of soft computing to architecture
Application of soft computing to decision-support systems
Application of soft computing to power systems
Neurofuzzy systems
Fuzzy logic control

At Berkeley, BISC provides a supportive environment for visitors, postdocs and students who are inter-

ested in soft computing and ist applications. In the main, support for BISC comes from member companies. Currently, the founding members of BISC are Matsushita, SGS-Thomson, Sharp, Siemens and Sony. In addition, there are members which support BISC on a lesser scale.

The BISC Bulletin Board (BBB) provides a mechanism for communicating information regarding employment and postdoc availability. BBB can also be used for other purposes.

A glimpse into the future

The successful applications of soft computing and the rapid growth of BISC suggest that the impact of soft computing will be felt increasingly in coming years. Soft computing is likely to play an especially important role in science and engineering, but eventually its influence may extend much farther.

In many ways, soft computing represents a significant paradigm shift in the aims of computing - a shift which reflects the fact that the human mind, unlike present day computers, possesses a remarkable ability to store and process information which is pervasively imprecise, uncertain and lacking in categoricity. In this perspective, what is important about BISC is that it provides a platform for the advancement of soft computing - a platform which lowers barriers between the constituents of soft computing and facilitates international cooperation on a global scale.

BISC Special Interest Groups

BISC SIG in Earth Sciences
BISC SIG in Recognition Technology
BISC SIG in Data Mining
BISC SIG in Granular Computing
BISC SIG on Intelligent Agents in Complex Systems
BISC SIG in Medical Imaging
BISC SIG in Philosophy of Soft Computing

BISC Mailing List

- If you want to post a message to the list you can send mail to bisc-group@cs.berkeley.edu
- If you want to subscribe to the list you can send mail to Majordomo@EECS.Berkeley.EDU with the following command in the body of your email message: subscribe bisc-group

BISC Staff People

Lotfi A. Zadeh – Director
C. Sequin – Associate Director
M. Tomizuka – Associate Director
Frank Hoffmann – Administrator
Michelle T. Lin – Secretary

How to join BISC

To join the BISC group, all you need to do is send your contact information to the BISC Administrator. The responsibilities of being a BISC member are mininal, but the benefits large. As a member of the BISC group, you will be in contact with members of the soft computing community. Please include information on your home WWW page if you would like to directly link with your name in the address list.

Frank Hoffmann, Ph.D., BISC Administrator,
http://http.cs.berkeley.edu/Research/Projects/Bisc/bisc.welcome.html

Conference Reports

Summer School Bioinformatics

Information Systems and Network Analysis of Gene Regulation and Metabolism

From September 5th to September 10th 1999 *The First International Summer School of Information Systems and Network Analysis of Gene Regulation and Metabolism* was organized in Magdeburg.

Post-genomic methods in molecular biology generate large amounts of expression data, which require computational methods for their storage, management, and analysis. Knowledge databases with information on genes not only as genome constituents but also as the elements of regulatory, signalling, and metabolic pathways are essential resource for “reverse engineering” regulatory and metabolic networks in the cell. An updated illustrative list of different methodologies available in the internet can be obtained at http://wwwiti.cs.uni-magdeburg.de/iti_bm/dagstuhl/demos.html.
The conclusion when looking at such a variety of approaches is that in order to support the analysis of gene regulation and metabolic network control we need distributed data access integrated with visualization, simulation, and analysis tools. Based on the experience of two international Dagstuhl Seminars on this topic (1995 and 1998, Schloss Dagstuhl, http://www.dag.uni-sb.de) we invited scientists to prepare specific courses.

Sequencing methods produce an exponential growing amount of data for DNA and protein sequences.

However, in the case of the human genome project ca. 64*10**9 bases will be available at the end of the year 2001. That means that the human genome can be published by approximately 1000 books of 1000 pages representing the letters A,T,C,G. Regarding this example the electronical representation of molecular data is important. The internet is a powerful medium which allows the worldwide access to the molecular information systems. Therefore, the internet is the main catalysator for the development of molecular database systems and information systems. Today the backbone of the electronical infrastructure for biotechnology and molecular biology can be characterized by the distributed molecular database systems. Based on this data different analysis tools are already developed and implemented. Most of these systems are also available via the internet. It is fundamental for the analysis of the cell functions to understand the phenomena of the gene regulation process. Genes can be isolated, sequenced and will be activated under specific biochemical situations. This means that metabolites will activate or deactivate specific genes and the protein synthesis process will produce metabolites, which are able to activate biochemical reactions and influence signal induction pathways.

The idea of the summer school was to present lectures for postgraduate students, which will present the electronical infrastructure for biotechnology. The summer school started with a mini symposium, which presented actual topics as metabolic pathways and metabolic engineering by invited talks. For over 30 years V. Ratner (Russia Academy of Science) discussed the metabolic processes using formal languages. He presented a summary of his work and discussed the DNA as a programming language. In the following Rolf Apweiler (EBI Cambridge) presented the basic molecular database systems and introduced the protein database system SWISSPROT. Finally, actual Bioinformatics research projects supported by the EBI were discussed. The information of promotor sequences and the transcription factors were collected by E. Wingender (GBF Braunschweig). He developed and implemented the database system, which represents the fundamental data of gene regulation. In his course he discussed the phenomena of gene regulation and the contents of the TRANSFAC system. However, the identification of Promotor sequences is fundamental for the discussion of gene regulation and metabolic pathways. Different tools are available for the detection of promotor sequences. A. Manson McGuire (Harvard Medical School) presented an overview of these methods in her lecture. Genes can be translated into proteins. Enzymes are specific proteins which allow the catalysis of biochemical reactions. Therefore, genes control the metabolism indirectly. More than 30 years ago G. Michal (Tutzingen) started collecting the knowledge about biochemical reactions. He is the editor of the Boehringer pathway chart, which represents the first collection and visualisation of this biochemical data. He presented the key ideas of his new book – the atlas of metabolic pathways. Based on that data the KEGG group implemented the first electronical system for metabolic processes. The leader of this workgroup M. Kanehisa (University Kyoto) presented the KEGG system and important applications. Moreover, he presented new ideas about the simulation of metabolic pathways using graph theoretical approaches. The next topic of the summer school was the electronical representation of signal induction pathways. R. Brent (Molecular Sciences Institute, Berkeley) discussed the protein/protein interactions and N. Kolchanov (Russia Academy of Science, Novosibirsk) discussed the biology of cell signal pathways and the electronical representation. Regarding gene expression and signal pathways the question of cell differentiation is important. The fundamental processes of cell differentiation was presented by J. Reinitz (Mt. Sinai Med. School, New York). Behind the molecular data and the systematic representation of the molecular data using electronical tools and database systems one application is the modeling and simulation of these processes based on that data. Different models and simulation environments are developed and available. All these models can be classified into two classes the quantitative and qualitative models. For the topic of simulation of metabolic processes M. Tomita (University Keio) was invited. He presented his object oriented simulation environment E-Cell, which is able to simulate virtual cells and parts of biochemical networks. The advantage of E-Cell is the user interface, which supports experiments in hypothetic worlds. Regarding E-Cell or any simulation environment in the Internet the disadvantage of these systems is visible. All these systems have no automatic access to the molecular database systems. In the case of E-Cell the user has to open for example the KEGG system and has to create the E-Cell models by hand. For the support of the ideas of metabolic engineering this is not sufficient. Metabolic engineering belongs to the actual topics of biotechnology. The idea is to implement software tools for the analysis and synthesis of metabolic processes. M. Reuss (University Stuttgart) presented a basic course of the methods and goals of this new research field. The key idea is that metabolic engineering is a multi-disciplinary subject and that we have to develop the virtual labour, which can be used as a simulator of complex metabolic processes. The integration of molecular databases is fundamental for this vision and was the last topic of the

summer school. Therefore, T. Mück (University Vienna) presented the basic course of database systems and integration methods. Based on this course R. Hofestädt, U. Scholz and M. Lange (University Magdeburg) presented the prototype of a Information Fusion System for the simulation of metabolic processes.

Biotechnology belongs to the most important subject of the next century. During the last years ca. 2000 companies were founded in western Europe and we are just at the beginning of this process. An important tool is the electronical representation and the electronical analysis of this data. The problem is that we have not enough bioinformatic scientists at the moment. The reason for this dilemma is that the universities did not build up new structures. In Germany only three universities just started with the education of this new subject. To close this gap was one reason to organize and establish this international summer school. To build up a new infrastructure the German Foundation of Science just spent 50 mill. DM to support three or four universities in the future. However, the next five years the German universities will not produce interdisciplinary scientists in the field of bioinformatics. To close this gap we have to organize more interdisciplinary summer schools or special courses.

This summer school was supported by the Volkswagen-Stiftung. Based on this grant we invited the lectures and selected 28 graduate students of Biology, Medicine, Computer Science, Biophysics, Biomathematics, and Biochemical Engineering. One idea of this Summer school was to develop and implement electronical courses. These courses will be available at the end of October and can be used worldwide via internet.

http://wwwiti.cs.uni-magdeburg.de/iti_bm/ibss/

Furthermore, a book will appear at the beginning of the next year.

Ralf Hofestädt, Department for Computer Science, University Magdeburg, email: hofestaed@iti.cs.uni-magdeburg.de

Industry News

MathTools

Rapid Data Ltd has signed an agreement with the MathTools to distribute their family of products. These include MATCOM, the tool that enables you to compile MATLAB programs into standalone royalty-free executables, and the very powerful MIDEVA, which is a MATLAB-like environment that includes an M-file interpreter and offers many features for developing and running M-file applications. Furthermore, many specialists from different application areas have developed toolboxes that can be downloaded from the MathTools web site free of charge. Further information, as well as the possibility of downloading the demonstration system, can also be found in Rapid Data's web site www.radata.demon.co.uk

Rapid Data has recently received orders from DLR in Munich and from both DASA in Munich and Hamburg to supply them with the AVDS aerospace simulation and visualisation software.

Rapid Data Ltd, Amelia House, Crescent Road, Worthing, West Sussex BN11 1RL, Tel +44-1903 821 266, Fax +44-1903 820 762, email: ali@radata.demon.co.uk, WWW: http://www.radata.demon.co.uk

MathEngine Code for Cash Competition

MathEngine announced the launch of its worldwide MathEngine Code for Cash Competition, open from September 7 through November 29, 1999 at www. mathengine.com. The competition will challenge developers of all ages to use the MathEngine Fast Dynamics Toolkit to create natural behavior programs featuring MathEngine applications.

The MathEngine Fast Dynamics Toolkit is a powerful development suite that allows physicists and non-physicists to incorporate real-time physics behavior into their applications on high-end to mass-market platforms, such as consoles, PCs and set-top boxes. The Toolkit provides an Application Programming Interface (API) and is designed to be an easy to use, low-level physics interface.

Competitors will vie for the Grand Prize of $5,000 and an array of other awards, including a set of MathEngine beanbag chairs designed by MathEngine's award-winning designer, Kam Tang.
See the MathEngine web site www.mathengine.com for competition rules.

National Semiconductor Introduces power.national.com

National Semiconductor has announced the introduction of http://power.national.com, the semiconductor industry's first comprehensive web environment for power supply designers, featuring a unique browser-based simulation tool.

This secure site allows design engineers to select an architecture and a device, validate their design through simulations, order products from National's broad range of power management solutions, and create a bill of materials all in a single web session, reducing the time and expense of power supply development and allowing designers to shorten design cycles.

Book Reviews

A Compositional Approach to Performance Modelling
Jane Hillston
Series "Distinguished Dissertations in Computer Science"
ISBN 0-521-57189-8
Cambridge University Press 1996

This book, the first in a new publication series on behalf of the Conference of Professors of Computer Science, in conjunction with the British Computer Society (BCS), presents a stochastic extension of process algebra, short PEPA. The algebra is shown to be suitable for specifying a Markov process, which then can be applied to performance modelling. The method, which is illustrated with case studies taken from the area of communication systems, can readily be used to construct a variety of models that can be analysed using standard numerical techniques.

The PEPA model claims to be superior over standard methods for specifying stochastic performance models, because it introduces a new inherent apparatus for reasoning about the structure and behaviour of models. In later chapters this apparatus is exploited to define four equivalence relations over PEPA components. Each of these notions of equivalence has intrinsic interest from a process algebra perspective. However, they are also demonstrated to be useful in a performance modelling context.

To conclude the book a section has been added surveying recent results in the area and discussing open questions.

S. Wassertheurer, ARGESIM TU Vienna

Methods and Models in Continuous Simulation
Methoden und Modelle der kontinuierlichen Simulation **(in German)**
Rüdiger Hohmann, Shaker Verlag, Aachen 1999
ISBN 3-8265-4738-1, 177 p.

This book gives a brief overview about simulation techniques of models in the area of physics and mechanics. The necessity of delta-, dirac- and stepfunction is outlined. Another main topic is the field of real-time-simulation, especially with hybrid systems. It gives a well structured summarization of concepts and applications of modelling and simulation. Most of the examples come from the area of mechanics, which gives also interesting hints to problems in simulation.

M. Wibmer, mwibmer@osiris.tuwien.ac.at

Dynamics of Systems and Simulation
Systemdynamik und Simulation **(in German)**
M. Gipser
ISBN 3-519-02743-7
B. G. Teubner Verlag 1999, 307 p.

In this book the author deals with methods for description and modelling, for understanding and analysis, and for function and optimisation of dynamical systems in technical applications.

First definitions and classifications are given, then various system descriptions are discussed, from transfer functions to differential-algebraic equations. The chapter on simulation deals as well with numerical as with software aspects. At the end case studies of simulation models in vehicle dynamics are presented.

The book can be highly recommended for engineers, but also for newcomers in this area. A detailed review (in German) can be found in *ASIM-Nachrichten* 3/99, November 1999.

F. Breitenecker, Vienna Univ. of Technology

Discovering Mathematics with Maple
R. J. Stroeker, J. F. Kaashoek
ISBN 3-7643-6091-7, Birkhäuser 1999
248 p. + CD-ROM

This book first aims for education in mathematical analysis, linear algebra, discrete probability theory, and discrete mathematics. This selection of mathematical topics shows the emphasis for students in econometrics and related areas, but not exclusively.

At time, the number of books on "Mathematics with Maple" (or any other Computer Algebra System, abbr. CAS) is growing almost weekly. But this book distinguishes itself from other existing ones significantly: the reader learns how to use Maple by posing problems of strictly mathematical nature, and – as result – the reader gets insight into the practical and theoretical framework of mathematics by means of Maple (or by another CAS).

The content shows an interesting selection of topics. "Function and Sequences" shows selected concepts from analysis, "Matrices and Vectors" concentrates e.g. on least square filters, "Computing and Summation" deals mainly with the binomial coefficients – up to binomial series and the De Moivre – Laplace limit theorem, "Derivative and Integral" continues the concept from analysis and shows e.g. the behaviour of Riemann's non-differentiable function, and "Vector Spaces and Linear Mappings" concentrates after basics on diagonalisation and singular value decomposition.

One highlight is e.g. the analysis of the Riemann function. By means of Maple (worksheets) the properties of this function are explored, analysed and displayed – a very interesting and very clear way to show such a complex function. This way starts with "simple" approximation by finite series and ends with a look on the fractial behaviour.

Each chapter closes with the description of Maple Worksheets, which the reader should investigate in Maple directly and with examples, which should be solved by "self-written" Maple structures.

The book comes with a CD, where all worksheets are stored, and where the reader finds also a demo and a trial version of Maple.

The book can be highly recommend i) for econometricians, engineers, and other scientists, who want to get insight into mathematical ideas and techniques, and ii) for mathema-

ticians, who get learned, how a CAS can also enrich the development also of theoretical concepts.

F. Breitenecker, Vienna Univ. of Technology

Theorie und Praxis von Simulationssystemen,
Eine Einführung für Ingenieure und Informatiker
Theory and Practice of Simulation Systems. An Introduction for Engineers and Computer Scientists. (In German)
Thomas Sauerbier
Vieweg, & Sohn, Braunschweig, Wiesbaden, 1999
ISBN 3 528 03866 7, 225 pages

This book gives a thorough introduction to theory and practice of simulation. It is aimed at engineers who use simulation or have to judge results gained by simulation and therefore need deeper insight. Many examples (most of them in C++ notation) illustrate the theory. The focus of the text lies on discrete event simulation.

The main topics of the book are: Modelling, implementation, verification and validation of models, analysis of results.

J. Scheikl, SIMTECH TU Vienna

Statistical and Probabilistic Models in Reliability
D.C. Ionescou, N. Liminos
Birkhäuser 1999
ISBN 0-8176-4068-1

This book presents twenty-four chapters providing a survey of models and methods for reliability analysis and applications in science, engineering and technology.

Each of these chapters is a paper selected by the editors from the sixty-one papers represented at the 1st International Conference on Mathematical Methods in Reliability held at the Politehnica University of Bucharest. The selected articles are divided into three sections and focus mostly on ideas concerning the modelling aspects.

A Preface gives a short introduction to the problem and importance of reliability.

Part one of the book consists of eight papers dealing with statistical methods such as Estimation Methods for Accelerating Life Data or Nonparametric Estimators of Reliability and Availability of Finite semi-Markov Systems.

The second part deals with probabilistic methods for instance Stochastical Models of Systems in Reliability Problems or Asymptotic Results for the Failure Time of Consecutive k-out-of-n Systems.

Part three represents Special Techniques and Applications: Exact Methods to Compute Reliability and Incremental Approach for Building Stochastic Petri Nets for Dependability Modeling are only two of seven papers this part of the book comprises.

All chapters are written in an accessible style using tables, data sets and graphs to convey a clear and practical perspective for the methods introduced by the authors.

The book features a Glossary of key technical terms as a support for the less experienced reader, but a basic knowledge of mathematics and modeling techniques is recommended.

Altogether this book offers a wide range of information on modeling in this field, as there are twenty-four authors, each of them representing different approaches.

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Stability and Oscillations of Nonlinear Pulse-Modulated Systems
A.Kh. Gelig, A. D. Churilov
Birkhäuser, Boston, 1998
ISBN 3-7643-3987-X, 362+xvi pages

This book is concerned with the controlling of nonlinear pulse-width, pulse frequency, and pulse-phase modulated systems by analysing the qualitative behavior of solutions with regard to stability and oscillations. The main method used in the book is called the averaging method, which combines the ideas of absolute stability theory and of averaging the impulsive signal. So the pulse-modulated systems can be extended to the fixed-point approach for study of forced oscillations.

The book is organized in 10 chapters. The first two give a short survey of the different types of pulse-modulated systems and of miscellaneous methods for investigating the stability of such systems. In the chapters 3 and 4 the averaging method is developed first for the stability problem of equilibria and then extended to the stability of whole processes. This method is again applied to the study of auto-oscillations in pulse-modulated systems and synchronizing effects concerning pulse-width modulated systems in the last but two chapters (9 and 10). In the rest of the book the problem of existence of periodic solutions are considered. Two conventional methods are described: the method of equations of periods in chapter 5 and the harmonic balance method in chapter 8. A new approach using the fixed-point method is developed in chapters 6 and 7 for analysing oscillations in pulse-width and pulse-frequency modulated system. The book ends with an extensive appendix presenting definitions and results used in the main part.

Although the book gives a very comprehensive introduction to pulse-modulated systems it is recommended that the reader has some basic knowledge in this field. So it will be useful for researchers, professionals in control theory, and applied mathematics working in the fields of control theory, functional differential equations, dynamical systems , pde's, and related topics.

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Dynamical Systems, Control, Coding, Computer Vision
New Trends, Interfaces and Interplay
Giorgio Picci, David D. Gilliam
Birkhäuser Verlag 1999
ISBN 3-7643-6060-7
Series Progress in Systems and Control Theory, Volume 25

This book is a collection of essays devoted in part to new research directions in systems, networks and control theory, and in part to the growing interaction of these disciplines with coding, computer vision, and hybrid systems. The essays,

written by world-renowned experts in the field, reproduce and expand plenary and minicourse/minisymposia invited lectures which were delivered at the Mathematical Theory of Networks and Systems Symposium (MNTS-98) held in Padova, Italy, on July 6-10, 1998.

Most of the essays require at least the knowledge of the basic principles in the specific fields. The reader should also be conform with the main mathematical concepts and techniques in linear algebra, analysis, functional analysis and ordinary and partial differential equations. The theory presented in the book has developed from the early phase of its history when the basic tools were elementary complex analysis, Laplace Transform, and linear differential equations, to the present day, where the mathematics range widely from functional analysis, PDEs, abstract algebra, stochastic processes and differential geometry.

This book should be a valuable reference to graduate students, scientists, and researchers in the area of information and control engineering and to mathematicians with an interest in the analysis and design of engineering systems. It should also be valuable to the system and control community as an introduction to system-related methods in coding, vision, and control of hybrid systems.

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Computational Methods for Representations of Groups and Algebras
P. Dräxler, G. O. Michler, C. M. Ringel (Eds.)
ISBN 3-7643-6063-1, Birkhäuser 1999, 357 p.

This book summarises most of the contributions presented at the 1st Euroconference of a joint European project "Invariants and Representations of Algebras". The lecturers had been invited in order to get a coverage of all central themes of computational methods representation of algebras.

The book consists of two parts. The first part deals with introductory topics, i.e. classification problems in representation theory, noncommutative Gröbner bases, and construction of finite matrix groups.

In the second part 17 contributions give a survey on general algorithmic and computational methods.

One interesting conclusion from the contributions is the fact, that computational and probabilistic tools (including high performance computations on supercomputers) are becoming more and more important for the classification and investigation of exceptional structures.

The book can be recommended for mathematicians and interested people to get insight into the modern computer-aided research in algebra.

F. Breitenecker, Vienna Univ. of Technology

Design of Hydraulic Machines
***Entwurf hydraulischer Maschinen* (in German)**
P. Beater
ISBN 3-540-65444-5, Springer Verlag 1999, 260 p.

The author presents an interesting survey on classical and modern design of hydraulic machines, from classical linear design methods to nonlinear modelling, stability analysis and simulation.

As interesting aspect the author gives different modelling approaches for hydraulic subsystems, underlining, that there exists no unique "model".

The book, written from the engineering viewpoint, addresses engineers, and can be also recommended for educational purpose. A detailed review (in German) can be found in *ASIM-Nachrichten* 3/99, November 1999.

F. Breitenecker, Vienna Univ. of Technology

Time-Frequency Representations
R. Tolimieri, M. An
ISBN 3-7643-3918-7, Birkhäuser 1998, 304 p.

This book, published in the series Applied and Numerical Harmonic Analysis, tries to bridge the gap from theory in this domain to „theoretical" applications, i.e. the development of suitable algorithms. The authors postulate "The algebraic point of view predominates as questions of convergence are not considered. Our approach emphasises the unifying role played by group structures on the development of theory and algorithms".

This aim is the background for the book's purpose, to present a theory of time-frequency representations over finite and finitely generated abelian groups, which can be used to design algorithms for multidimensional applications (e.g. imaging, electromagnetics, and communication theory).

He book consists of two main parts. The first part deals with Weyl-Heisenberg representations over finite abelian groups, the second with multirate filter structures over free abelian groups of finite rank. This concept – limiting the scope of generality - was chosen in order to allow the applications of the results to the design of algorithms and codes for time-frequency processing.

The first chapter gives a brief review of algebra, the following sixteen chapters deal with the theoretical approaches mentioned above. An interesting counterpart shows the last chapter, dealing with a "real" application: "time-frequency search for stock market analysis".

On the one side, the book seems to be dedicated to theoretical interested specialists in the area of harmonic analysis, on the other side the last chapter shows that highly theoretical constructs can efficiently be used in modern applications.

F. Breitenecker, Vienna Univ. of Technology

Engineering and Scientific Computation with Scilab
C. Gomez
ISBN 3-7643-4009-6, Birkhäuser 1999
520 p. + CD-ROM

Scilab is a scientific software package, which is freely distributed via the Internet since 1994. Based on a certain mixture of features from MATLAB, Maple, Mathematics, e.g., Scilab (Scientific Laboratory) is an interesting freeware alternative.

This book follows the idea of a broad variety of books: Engineering with MATLAB, Mathematics with Mathematica,

Mechanics with Maple, etc. As Scilab is not so prominent as the other tools, the book tries to cover most areas, from control and signal processing to simulation and optimisation based on DAEs.

The book consists of three parts. The first part introduces the Scilab Package (language, graphics, basic functions, advanced programming). The second part directs toward applications, presenting the various Scilab Tools ("Toolboxes") and their applications (System and Control Toolbox, Signal Processing Toolbox, Simulation and Optimisation Tools, SCICOS – the Dynamical System Builder and Simulator, Symbolic/Numeric Environment, Metanet - Graph and Network Toolbox).

The third part of the book discusses in detail two application with Scilab and Scilab Tools: modal identification of a mechanical structure, control of hydraulic equipment in a river valley.

The book can be highly recommended for students and professionals dealing with engineering and scientific computation – and seeking for a powerful software alternative. It is to be noted, that Scilab is really open – from source to graphics and documentation.

The book comes with a CD-ROM containing i) the entire source code of Scilab, ii) Scilab binaries for some operating systems, iii) Scilab programs illustrating the examples in the book.

F. Breitenecker, Vienna Univ. of Technology

UM99 – User Modelling
Proceedings of the Seventh Int. Conference
Judy KAY (ed), SpringerWienNewYork, 1999
ISBN 3-211-83151-7, 392 pages

These proceedings no. 407 out of the CSIM Courses and Lectures focus on the User Modelling in various areas of technical systems.

The conferences are held to overcome the borders of the different disciplines like AI, Education, Intelligent User Interfaces, Database Systems and many more. As the systems get more complex, the need of user adaptive interfaces increases to manage the complexity. This is gained mainly in two ways, either to improve the systems possibility to interpret the users demands, or to adapt the system on the users actions.

The number of papers on the various topics show the increasing importance of this field in interdisciplinary research and development. Especially worth to mention is the increasing influence of the global network including the World Wide Web on the customer.

This book gives an overview over the actual ways in user modelling. Even if most of the submitters are from Computer Science, the area of Psychology and Communication Science gets more and more influence. It can be a starting point for programmers to improve their user interfaces and also for everyone who has to improve the communication between technology and an "ordinary" user. Therefore this book is not only restricted to computer experts.

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News on Books and Journals

Simulation Practice and Theory

Simulation Practice and Theory (SIMPRA) is EUROSIM's scientific journal, published by Elsevier Science B.V. It publishes high quality contributions on modelling and simulation.

Forthcoming papers SIMPRA (status October 4, 1999)

In the bondgraph special issue

W. Borutzky, Supporting the generation of a state space model by adding tearing information to the bond graph

G. Dauphin-Tanguy, A. Rahmani, C. Sueur, Bond graph aided design of controlled systems

M. Sorli, L. Gastaldi, E. Codina, S. de las Heras, Dynamic analysis of pneumatic actuators

R.F. Ngwompo, S. Scavarda, Dimensioning problems in system design using bicausal bondgraphs

M. Delgado, C.Pichardo, Use of Matlab and 20-sim to simulate a flash separator

J.F. Broenink, 20-sim, software for hierarchical bondgraph/block-diagram models

P.Breedveld, On state-event constructs in physical system dynamics modeling

A. Mukherjee, R. Karmaker, A.K. Samantaray, Modelling of basic induction motors and source loading in rotor-motor systems with regenerative force field

F. Lorenz, A classification of modelling laguages for differential-algebraic equations

J. LeFèvre, L. Lefèvre, B. Couteiro, A bondgraph of chemo-mechanical transduction in the mammalian left ventricle.

K. Suzuki, I. Nakamura, J.U. Thomas, Pressure regulator valve by bondgraph

J. Thoma, Electric batteries and fuel cells modeled by bondgraphs

J. Thoma, J. Halin, Bondgraphs and practical simulation

W. Borutzky, Bondgraph modeling from an object oriented modeling point of view.

Regular papers

M. Metzger, A comparative evaluation of DRE integration method for real-time simulation of biological activated sludge processes

T. Perera, K. Liyanage, Methodology for rapid identification and collection in the simulation of manufacturing systems

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

Submissions of manuscripts should be sent to:

Prof. Dr. L. Dekker
Noordeindseweg 61
2651 LE Berkel en Rodenrijs, The Netherlands

Call for Papers
Special Issue on
Web-based Modeling and Simulation (WSIM)

Aims and Scope: Expected submissions to the WSIM special issue are in two main areas: Web-enabled Simulation Environments (**WSE**) and Web-enabled Distributed Interactive Simulation (**WDIS**).

WSE expected contributions are papers that deal with the reuse of simulation models made available on the Internet, and/or the use of www available tools. By use of WSE the user finds out which types of simulation models exist on the Internet, downloads the interesting models, or sub-models, customizes and integrates them at its local site and runs the obtained model either at the local site or on a remote site where the necessary simulation tool is available.

The papers may illustrate existing prototypes that implement all or part of such WSE functions, or illustrate the application of WSE enabling technologies (platform-independent portable languages, standards for model interoperability and model integration etc), or design criteria and application of agent and component-based simulation software.

WDIS expected contributions are papers that deal with Distributed Interactive Simulation (DIS) on the web. In DIS various simulation programs, or else components of a given program, interact through a network infrastructure not Internet specific. Contributions are sought on problems in the evolution of DIS into WDIS, on existing prototypes, on the application of WDIS enabling technologies (platform-independent portable languages, standards for model interoperability and model integration, virtual reality languages, cscw and cooperation languages etc), and on design criteria, and the application of agent and component-based simulation software.

Topics: The special issue invites to submit papers on research results, experience and application results, and survey/tutorials on emerging challenges related to WSE and WDIS. Topics include (but are not limited to): Sharing and reuse of simulation models and tools in WSE * WSE search for reusable models, classes and components * Integration and interoperability of models in WSE * Platform-independent languages, distributed object technologies in WSE and WDIS * Agent-oriented and component-based approaches to WSE and WDIS * The evolution of DIS into WDIS (problems with the integration of HLA and web technologies etc.) * Security problems in WSE and WDIS * Simulation visualization/ animation in WSE and WDIS * Applications of WSE and WDIS

Important Dates:

Paper submission due	April 1, 2000
Notification of acceptance	August 1, 2000
Final manuscript due	November 1, 2000
Expected publication	December 2000

Paper Submission: Submit 5 copies of the complete manuscript, not to exceed 20 double-spaced pages (excluding figures and tables) to the guest editor.

Guest Editor: Prof. Giuseppe Iazeolla, Software Engineering Chair, Laboratory for Computer Science, University of Roma at TorVergata, 110 Via di TorVergata, I-00133, Roma, Italy, Phone/Fax: +39-6 72 59 73 76, email: iazeolla@info.uniroma2.it

Robotics and Autonomous Systems

The journal Robotics and Autonomous Systems carries articles describing fundamental developments in the field of robotics, with special emphasis on autonomous systems.

Editors-in-Chief: F.C.A. Groen, University of Amsterdam and T.C. Henderson, University of Utah

Special column: Robotics Competition corner appearing in each issue.

Benefits for readers: Free electronic access to full text papers, abstracts of forthcoming and published articles, free-text search facilities on keywords, abstracts and authors.

Access the journals website:
http://www.elsevier.nl/
locate/robot for more information.

New Books

Recent books and volumes in the series "Studies in Fuzziness and Soft Computing" published by the Springer-Verlag group (Physica-Verlag, Heidelberg and New York) and edited by Prof. Janusz Kacprzyk

vol. 32 K. Hirota and T. Fukuda (Eds.) "Soft Computing in Mechatronics" 1999, 186 pp. ISBN 3-7908-1212-9

vol. 33 L.A. Zadeh and J. Kacprzyk (Eds.) "Computing with Words in Information/Intelligent Systems 1: Foundations" 1999, 517 pp. ISBN 3-7908-1217-X

vol. 34 L.A. Zadeh and J. Kacprzyk (Eds.) "Computing with Words in Information/Intelligent Systems 2: Applications" 1999, 609 pp. ISBN 3-7908-1218-8

vol. 35 K.T. Atanassov "Intuitionistic Fuzzy Sets: Theory and Applications" 1999, 323 pp. ISBN 3-7908-1228-5

For more information on these and previous books and volumes see the WWW page of the series: http://www.springer.de/

Intelligent Data Analysis: An Introduction edited by Michael Berthold and David J. Hand Springer-Verlag, 1999. ISBN 3-540-65808-4

The idea for this book arose when, through teaching classes on IDA and doing consulting work, the authors realized that there was no coherent textbook to which they could direct students or interested researchers and practitioners in the field. They considered writing such a book themselves, but abandoned this idea when they realised how wide would be the range of topics which should be covered. Instead, they decided to invite appropriate experts to contribute separate chapters on various fields, and took pains to ensure that these chapters complemented and built on each other, so that a rounded picture resulted. The areas covered are: Statistical Concepts, Statistical Methods, Bayesian Methods, Analysis of Time Series, Rule Induction, Neural Networks, Fuzzy Logic, Stochastic Search Methods. The book begins with an introduction to the field of intelligent data analysis and concludes with a discussion of applications and a list of available tools.

The table of contents and the preface can be accessed from the Springer (Germany) web-site at: http://www.springer.de/

New book series:
"Advances in Soft Computing"
launched by the Springer-Verlag group (Physica-Verlag, Heidelberg and New York) and edited by Janusz Kacprzyk.

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Classes on Simulation

November 1999

30-December 1
Einsatz von Simulink in der Regelungstechnik. Aachen, Germany.
Contact: Scientific Computers, Franzstr. 107-109, D- 52064 Aachen, Tel.: +49-241- 47075-0, Fax: +49-241- 44983, email: info@scientific.de

December 1999

14-15 ***Simulation von Zustandsautomaten mit Stateflow***. Aachen, Germany.
Contact: Scientific Computers

13 ***Simulation mit ACSL.*** TU Vienna, Austria
Contact: ARGESIM, TU Wien, Abt. Simulationstechnik, Wiedner Hauptstraße 8-10, A-1040 Wien, Tel: +43-1 58801 11452, Fax: +43-1 58801 11499, email: seminar@argesim.org

14 ***Modellbildung und Simulation mit DYMOLA.*** TU Vienna, Austria
Contact: ARGESIM, TU Wien

January 2000

12-14 **Micro Saint Course.** Worthing, U.K.
Contact: Rapid Data Ltd, Amelia House, Crescent Road, Worthing, West Sussex BN11 1RL, Tel +44-1903 821 266, Fax +44-1903 820 762, email: ali@radata.demon.co.uk
WWW: http://www.radata.demon.co.uk

February 2000

1 ***Seminar on New Developments in Simulation Technique.***
TU Vienna, Austria
Contact: ARGESIM, TU Wien

March 2000

13-14 ***Kurs MATLAB.*** Munich, Germany.
Contact: BAUSCH-GALL GmbH, Wohlfartstr. 21b, D-80939 München, Tel: +49-89 3232625, Fax: +49-89 3231063, email: BauschGall@compuserve.com

14-15 ***Einführung in MATLAB mit ausgewählten Toolboxen.***
Aachen, Germany.
Contact: Scientific Computers

27-29 ***Kurs SIMULINK.*** Munich, Germany.
Contact: BAUSCH-GALL GmbH

28-29 ***Einführung in SIMULINK mit ausgewählten Toolboxen.***
Aachen, Germany.
Contact: Scientific Computers

Calendar of Events

December 1999

5-8 **WSC'99.** Winter Simulation Conference. Phoenix, Arizona
Contact: WWW: http://www.wintersim.org/

February 2000

2-4 **3rd MATHMOD. International Symposium on Mathematical Modelling**. Vienna, Austria
Contact: Prof.Dr. Inge Troch, Technische Universitaet Wien, Wiedner Hauptstrasse 8-10, A-1040 Wien, Tel.: +43-1-58801-11451, Fax: +43-1-58801-11499, email: inge.troch@tuwien.ac.at, WWW: http://simtech.tuwien.ac.at/3rdMATHMOD/

21-22 **ASIM-STS'2000. Meeting ASDIM-FG "*Simulation Technischer Systeme*"**. Esslingen, Germany
Contact: Prof.Dr.Ing. Gerald Kampe, FHT Esslingen, Flandernstraße 101, D-73732 Esslingen, Tel.: +49-711-397-4221, Fax: +49-711-397-4212, email: gerald.kampe@fht-esslingen.de

March 2000

8-9 **ASIM-SPL'2000. 9th Conference of ASIM FG "*Simulation in Produktion und Logistik*"**. Berlin, Germany
Contact: Dipl.Phys. Markus Rabe, IPK Berlin, Pascalstraße 8-9, D-10587 Berlin, Tel.: +49-30-39006-248, Fax: +49-30-3932503, email: markus.rabe@ipk.fhg.de

12-14 **Meeting ASIM FG"*Simulation in Umweltanwendungen*"**. Hamburg, Germany
Contact: Dr.-Ing. J. Wittmann, Universität Rostck, D-18059 Rostock, email: wittmann@informatik.uni-rostock.de

13-15 **7th Symposium "Simulation for managerial decision support"**. Braunlage, Germany
Contact: Prof.Dr. Wilhelm Hummeltenberg, Universität Hamburg, Institut für Wirtschaftsinformatik, Max-Brauer-Allee 60, D-22765 Hamburg, Tel.: +49 40 4123 4023, Fax: +49 40 4123 6441, email: wi@mba.uni-hamburg.de

20-21 **"*Multiagentensysteme und Individuenbasierte Simulation*" ASIM FG 1 & FG 3**. Würzburg, Germany
Contact: Prof. Helena Szczerbicka, Universität Bremen, Fachbereich 3 - Informatik, Postfach 33 04 40, D-28334 Bremen, Tel.: +49-421 218 7389 or 7390

23-24 ***Simulation und Visualisierung 2000***. Magdeburg, Germany
Contact: Institut f. Simulation und Graphik, Otto-von-Guericke Universität Magdeburg, Universitätsplatz 2, D-39106 Magdeburg, Tel.: +49-391 67 18342, Fax: +49-391 67 11164, email: technik@tagung.simvis.org, WWW: http://www.simvis.org/tagung2000/

April 2000

6-8 **Ebernburg Conference. ASIM FG "*Simulation in Medizin, Biologie und Ökologie*"**. Ebernburg, Germany
Contact: Prof.Dr. Dietmar P.F. Möller, Universität Hamburg, Inst. f. Informatik, D-22527 Hamburg, Fax: +49-40-5495 2206, email: dietmar.moeller@informatik.uni-hamburg.de

17-19 **ECEC 2000. 7th European Concurrent Engineering Conference**. Leicester, U.K.
Contact: Philippe Geril, SCS Europe, c/o University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: philippe.geril@rug.ac.be, WWW: http://hobbes.rug.ac.be/~scs/

May 2000

2-4 **MOSIS 2000. 34th Int. Conference on Modelling and Simulation of Systems**. Roznov pod Radhostem, Czech Republik
Contact: Jan Stefan, FEI -VSB TU, Ostrava, tr. 17. Listopadu 15, CZ-70833 Ostrava Poruba, email: jan.stefan@vsb.cz, WWW: http://www.fee.vutbr.cz/UIVT/ism/

2-3 **Workshop: Agent Based Simulation**. Passau, Germany
Contact: , WWW: http://www.or.uni-passau.de/workshop2000/

8-10 **EUROMEDIA 2000.** Antwerp, Belgium
Contact: Philippe Geril, SCS Europe, c/o University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: Philippe.Geril@rug.ac.be, WWW: http://hobbes.rug.ac.be/~scs/conf/euromed2000/

11-12 ***Computational Intelligence und industrielle Anwendungen. VDI/ VDE-Gesellschaft/GMA und GI.***. Baden-Baden, Germany
Contact: Mrs. A. Schillings, VDI/VDE-Gesellschaft Mess- und Automatisierungstechnik, Postfach 10 11 39, D-40002 Düsseldorf, email: schillings@vdi.de

23-26 **ESM 2000.** ***14th European Simulation Multiconference***. Ghent, Belgium
Contact: Philippe Geril, SCS European Simulation Office, University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, email: Philippe.Geril@rug.ac.be, WWW: http://hobbes.rug.ac.be/~scs/

28-31 **PADS 2000.** 14t Workshop on Parallel and Distributed Simulation. Bologna, Italy
Contact: David Bruce, Defence Evaluation and Research Agency, St. Andrews Road, UK-Malvern WR14 3PS, Tel.: +44-1684 895112, Fax: +44-1684 894389, email: dib@dera.gov.uk, WWW: www.dcs.exeter.ac.uk/~pads2000/

June 2000

13-16 **ITI 2000. 22nd Int. Conference Information Technology Interfaces.** Pula, Croatia
Contact: Conference Secretariat ITI 2000, University Computing Centre, Josipa Marohnica bb, HR-10000 Zagreb, Croatia, Tel.: +385-1-616 55 97, Fax: +385-1-616 55 91, email: iti@srce.hr, WWW: http://www.srce.hr/iti/

26-27 **FOODSIM 20000. International Conference on Simulation in Food and Bio Industries**. Nantes, France
Contact: Philippe Geril, SCS Europe, c/o University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, email: Philippe.Geril@rug.ac.be, WWW: http://hobbes.rug.ac.be/~scs/conf/FOODSIM2000/

August 2000

21-25 **IMACS Congress 2000. 16th IMACS World Congress.** Lausanne, Switzerland
Contact: Prof. Robert Owens, IMACS Congress 2000, DGM - IMHEF - LMF, Swiss Federal Institute of Technology, CH-1015 Lausanne, Fax: +41-21-693-3646, email: robert.owens@epfl.ch, WWW: http://IMACS2000.epfl.ch/

September 2000

12-14 **ASIS 2000. 22nd Intl. Workshop Advanced Simulation Systems**. Czech republic
Contact: Jan Stefan, FEI -VSB TU, Ostrava, tr. 17. Listopadu, CZ-70833 Ostrava Poruba, email: Jan.Stefan@vsb.cz

18-20 **ASIM / ESS'2000.** ***14. Symposium Simulationstechnik*** together with European Simulation Symposium. Hamburg, Germany
Contact: Prof.Dr. Dietmar P.F. Möller, Universität Hamburg, Inst. f. Informatik, Vogt-Kölln-Strasse 30, D-22527 Hamburg, Fax: +49-40-5494 2206, email: dietmar.moeller@informatik.uni-hamburg.de

20-22 **ESS'2000. European Simulation Symposium**. Hamburg, Germany
Contact: Philippe Geril, SCS Europe, c/o University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: Philippe.Geril@rug.ac.be, WWW: http://hobbes.rug.ac.be/~scs/

June 2001

27-30 **EUROSIM 2001. 4th International EUROSIM Congress**. Delft, The Netherlands
Contact: Mrs. T. Tijanova, Delft University of Technology, Faculty of Information Technology and Systems, P.O. Box 5031, NL-2600 GA Delft, , Fax: +31-15-2787209, email: eurosim2001@pa.twi.tudelft.nl, WWW: http://ta.twi.tudelft.nl/PA/Eurosim2001/

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Aims and Scope

The journal *Simulation News Europe* (abbreviated SNE) publishes information related to modelling and simulation.

SNE's aims are: to inform about new developments in simulation methodologies, applications and software and hardware for modeling and simulation, to report news from European simulation societies and European simulation events and from international simulation societies and working groups all over the world. SNE is the official membership journal of EUROSIM and SCS Europe.

SNE contains news on EUROSIM, on the EUROSIM societies, on SCS Europe, on SIGSIM/ACM, on other international simulation societies and groups, and on software user groups.

SNE publishes essays and short technical notes dealing with new developments in a particular area and reports on software and hardware developments, new applications and new methodologies and their applications. SNE presents simulation centers and announces simulation events and classes in a calendar of events. The section on industry news contains the latest news available through press releases and announcements. There are book reviews and book news.

A special series on simulation comparisons gives a comprehensive overview on features and developments of simulation software and hardware, including parallelization techniques. These comparisons are also becoming standard benchmarks for simulation programs.

SNE is a printed journal as well as an electronic journal. ARGESIM's WWW server can be found at http://www.argesim.org/sne/. All contributions are selected and may be edited by the editors of the journal.

Simulation News Europe

Scope: Information on simulation activities, membership information for European simulation societies and SCS Europe,comparisons on simulation techniques

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