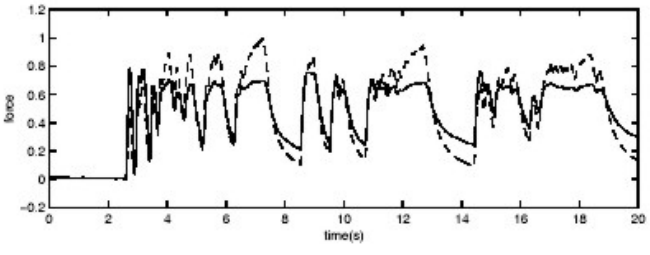
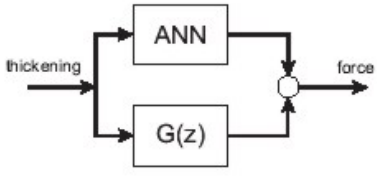
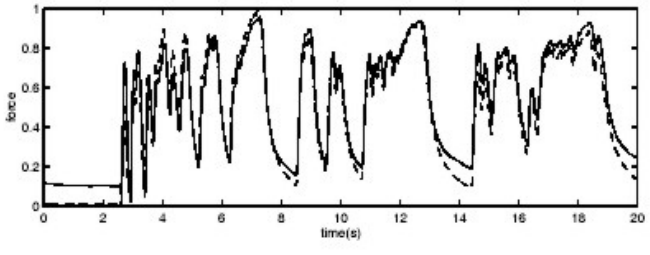
SIMULATION NEWS EUROPE

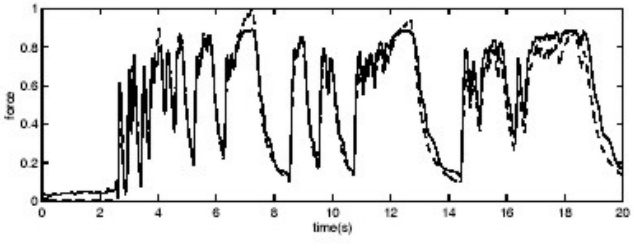
S N E

A European Forum on
Development in Modeling and Simulation









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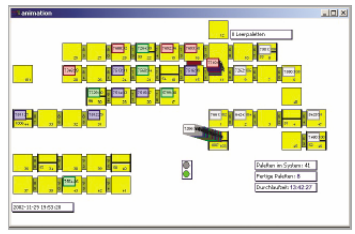

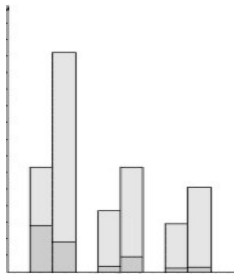

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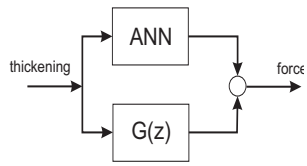

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…….And Much More

Imprint

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

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EDITORIAL

Dear readers,

This issue again continues the opening of SNE towards alternative modelling approaches and simulation- related areas. The new Comparison C18 'Identification of Nonlinear Dynamics – Neural Nets versus Transfer Functions' is the third one, which does not address different simulation tools, but which addresses the comparison of different modelling approaches.

We are happy, that we have got eight comparison solutions. Interestingly, also here one can observe that more general solutions to the more general comparisons are sent in. We will continue with comparisons of this new kind, and we will complete the Comparisons by a more detailed model description and model derivation, introducing also into applications and backgrounds. These model descriptions will start in the next issue (although promised for this issue – but we were limited in space). Each comparison can then be used as self-containing part of a lecture on modelling and simulation, with model description and derivation, application area and background, comparison definition (i. e. specification of exercise or case study), various solutions, and various implemented models with sources.

The Technical Notes and Short Notes also reflect the fact, that nowadays modelling and simulation is met in very different areas, and that modelling and simulation is not only linked to ODE and DEVS modelling. Joahnnes Krauth from SimServ has summarised a five-year experiences in a Technical Note on simulation for production planning, and Bernhard Kabelka from Vienna University of Technology lets compete high-level simulators with general purpose programming languages for production planning. By change, these two Technical Notes complement Björn Johansson Technical Note from the last issue (on dynamic rough cut analysis of simulation tools).

The reorganisation of SNE – separation of News Section from Notes Section, more general Comparisons, etc. – will result in a new layout from the next issue on. The new layout will underline the status of SNE as well as scientific journal (with reviewed Notes Section) as well as News Journal for EUROSIM.

We thank all authors and members of the editorial boards for their co-operation. Unfortunately again we must ask to take more care on the deadline, so that each society can publish information in time; deadline for the next issue ***SNE 44/45*** *(December 2005) is December 1st, 2005.*

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

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Aims & Scope

The journal **SNE - S**imulation **N**ews **E**urope – is intended

- to inform about developments in modelling and simulation by technical notes, short notes, software notes and comparisons, and
- to report about news from European simulation societies and events from International Simulation Societies and Simulation Groups all over the world.

SNE is the also the official membership journal of EUROSIM and SCS Europe.

SNE reports in the *News Section* about EUROSIM, EUROSIM societies, SCS Europe and about other International Simulation Societies and Simulation Groups.

SNE's *Notes Section* publishes technical notes (fully reviewed), short notes (reviewed), and software notes on general overviews or new developments, on new software and hardware, on new applications and methods. Furthermore **SNE** presents *Simulation Centres,* introduces *Simulationists* and reviews recent books on modelling and simulation and related topics.

SNE's special series *Comparison of Modelling and Simulation Technique and Tools* (**ARGESIM Comparisons**) gives a comprehensive overview on developments in application and implementation.

Parts of **SNE** can be also found on the web, e.g. an archive and an evaluation of the Comparisons: www.argesim.org

All contributions are selected and may be edited. For news publication, please contact a member of SNE's News Editorial Board (p. XVI), for publication of technical notes, short notes, etc. please contact a member of SNE's General Editorial Board (p. 40) or the Editor-in-Chief.

TECHNICAL NOTES

Simulation Based Production Planning and Scheduling: Sim-Serv's Experience

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… deals with simulation-based production planning and scheduling,

… reports on a number of industrial projects carried out in the framework of Sim-Serv

… compares different approaches and software for modelling and simulation of discrete systems,

… and shows, which improvements large as well as small and medium-sized enterprises can achieve by using simulation and optimisation tools.

Abstract

This paper reports on a number of industrial projects carried out in the framework of Sim-Serv, the Virtual Institute for Production Oriented Simulation Services or by its members. The common goal was to improve production planning and scheduling in the customer company. The reported experience proves that advanced simulation and optimisation tools can efficiently solve a wide range of real-world problems, and that their implementation of economically very interesting, even for small companies.

Motivation

Production planning and scheduling tools are widely used in European manufacturing industry. Almost all large, and the majority of small and medium sized enterprises are using MRP and ERP systems for many years. Yet a number of problems around planning and scheduling are still unsolved, mainly in the area of short term scheduling and real-time control. Conventional planning tools are often not dealing with real-time shop floor data. And most of their calculations are based on time and capacities only, not taking into account any technical or organisational restrictions.

These limitations imply that in many cases, the schedules calculated by these systems are not applicable in practice. As a result, shop floor staff considers them not helpful, and tends to ignore them. In turn, they often do not feed back actual data to the planning staff. Hence, the data used in the MPR or ERP tools are often unrealistic.

Conventional Planning Tools: A Case Study

A medium sized manufacturer of toys in Germany runs an MRP system since many years, but they are not satisfied with it ([1]). An analysis of data stored in the system and of applied planning procedures revealed that:

- the system assumes 140 work stations but allocates orders to only 72 of them. 52 stations are ignored, 14 stations do not (no longer) exist in reality.
- the assumed throughput times per department wee agreed with the respective foremen some time ago and deviate substantially from the process times as shown in table 1.
- the planned utilisation of some work stations is 500%!
- feedback from shop floor to the MRP tool is only provided on weekends, hence orders are often released much too late.
- many orders have a delay of several months
- warehouse contents in the MRP system and in reality do not coincide at all. Thus often orders are release for which the material is not available.
- the department heads on the shop floor do their own scheduling using Excel. However, these schedules must be changed very frequently.

As a result, many orders are lost, and on the other hand many orders are erroneously produced to stock. [1]

Department No.	Assumed Throughput Time	Real Process Time
1	22 labour days	1 hour
2	5 labour days	22 hours
3	7 labour days	1,5 hours
4	7 labour days	10 hours
5	15 labour days	1,5 hours
6	15 labour days	20 hours
7	5 labour days	1,5 hours

Table 1: Assumed throughput times and process times of departments ([1])

Contribution of Simulation Technology

Simulation is well known as a powerful tool supporting the design, layout or re-design of factories and production systems [1]. Recently, many successful applications proved that it can also support the operation of manufacturing systems, especially in the area of scheduling and control. Experience documented below proves that also SMEs can take advantage of these developments.

In general, one can distinguish two ways of using simulation for improving production planning and scheduling:

1. A simulation model is used to configure, test and fine-tune an existing planning tool. Many planning tools offer a wide range of parameters and option to allow their adaptation to different application areas. However, often the number of possible configurations is so large that even experts cannot predict any more which is best or even good. A simulation model can be used to test configurations and evaluate their effects on the company's objectives. This way of testing is much faster and less expensive than testing in reality.

2. A simulation model is used "online" as part of the planning tool box and runs in parallel to the real production process. It can take into account all kinds of rules and constraints and does the bulk of routine work for the human planner. Using real shop floor data, it calculates exactly the throughput times and can very quickly evaluate the effects of schedule changes. These tools are known as "Leitstand" or "APS (advanced planning and scheduling) tools. Most of them have a built-in optimisation algorithm which automatically schedules orders in such a way that enterprise objectives are met in a very good way.

These two ways of using simulation are not to be seen as alternatives. Sometimes it makes sense to use both of them. This is illustrated in example 4.3 below.

Practical Examples for the Use of Simulation in Support of Production Scheduling

First, examples 1-3 illustrate the first way, and then examples 3-5 report about the benefits of introducing simulation based APS tools.

1. Example: Case Study Continued

The enterprise mentioned in the case study above used simulation in the first way and found that

- substantially shorter throughput times can be achieved, and the extreme work load at many work stations would decrease automatically as a by-product
- the flow of production would be much smoother if special strategy for releasing orders were applied. This strategy should be oriented to balance the load of bottleneck stations. As a by-product, the need for short term re-scheduling would decrease dramatically.

These findings shall now be put to practice in the enterprise [1].

2. Example: Manufacturing of Tools

This company produces a large variety of cutting tools ([2], [3]). The production process consists of eight steps with several tests in between. The company used simulation in order to find ways how its profitability could be increased. Among others, also the use of the MRP system was to be investigated.

The results of simulation were very surprising: All activities that were taken into account by the management proved useless. Some examples:

- Optimisation of lot sizes: The lot sizes had already been optimised in earlier projects.
- More machines: Useless since bottlenecks were moving. Additional machines would not be utilised at an economic level.
- Concentration, rejection of small orders: in this company, small orders can be used as "fillers".

On the other hand, simulation experiments proved that by a new organisation and a more flexible way of production planning,

- throughput times could be reduced by 50%
- work in progress would decrease substantially
- delivery reliability could grow by 10%

The necessary changes would not require any major investment, but

- a higher and more flexible qualification of workers
- more flexible shift models
- a radically new configuration of the MRP system so that it can exploit the increased flexibility of resources

These measures are now being realised one by one in the company. The company expects saving of more than 500,000 €. The expenses of the study were approx. 40,000 €, and the total payback time of the reorganisation project is less than 6 months.

3. Example: Decorpart

DECORPART is a medium-sized company, which supplies small, pressed aluminium parts to a range of other consumer-focused businesses. Typical applications include spray assemblies for perfumes and dispenser units for asthma sufferers. The business lies in a highly competitive sector and success depends on achieving high efficiency and low cost of manufacturing.

In the past, Decorpart had already installed simulation based, finite capacity scheduling tools supporting the scheduling of individual areas of the production process. This had led to substantial increase of planning accuracy and allowed them to reduce the stock of raw material by 300,000 GBP ([4]). To improve the overall performance, increase output and reduce lead time, they now planned to implement an overall scheduling system co-ordinating all local systems.

Modern production scheduling tools are very powerful and offer a range of options and parameters for adapting the tool's behaviour to the requirements of the real process. However, the more options exist, the more difficult it becomes to find the best configuration of the tool. Even experts often cannot predict the effects of the many possibilities. Testing out even a small number of possible configurations in reality, and studying their effects on the real production process might take months and might severely reduce the overall performance. Hence such tests are not feasible in practice.

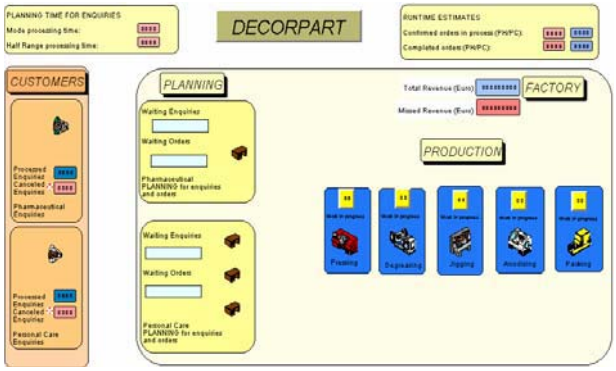

Figure 1: A high level simulation model of Decorpart's entire business/production

In order to deliver their customer the best possible solution, the supplier of the scheduling tool, Preactor International decided to use a simulation model for finding the optimal configuration of the scheduling tool (5).

A custom-built model was built that simulates the arrival of orders, their queuing and their flow through all steps of the production process. For the overall coordination and schedule optimisation, each process stage was modelled as a group of machines with an overall capacity per day or per week. In order to check if the model reflects the real process adequately, a set of real data was compared with the data produced by the simulation. It was found that the model and the real process produce more or less identical results.

The anodising process was known to be particularly important for the overall production. Therefore the model of this process was refined and the individual anodising tanks were described in detail, so that colour changeover and set-up times could be studied more precisely. In this way, it was tested to what extent the overall lead time of orders can be reduced by optimisation of the anodising process stage.

Next, the Preactor scheduling tool was coupled with:

- a high level manufacturing/business system model,
- a detailed representation of the anodising process, both of which were prepared by Riga Technical University.

These two simulation models were used for testing initial configuration of the scheduler and for iterative optimisation of its parameters and rules off-line prior to its implementation at Decorpart.

The high level model of the entire business provided the following results:

1. If the response time for customer enquiries could be reduced by 5 %, the total revenue of the company would grow by about 10 %. The maximum revenue could be achieved if c planning time would not exceed 6 minutes.
2. By introducing the automatic PREACTOR Supply Chain Server, a maximum response time of 6 minutes per inquiry can be achieved.
3. In this case, the number of cancelled orders can be decreased by 14-18%, which would cause the total revenue or value of confirmed orders to increase by 100% (or twice).
4. Instead of four planners, only one would be needed if the PREACTOR tool were introduced. Thus, employment cost of approx. 150 000 Euro per year can be saved.

The detailed model of the anodising stage led to the conclusion that improved sequencing rules for incoming orders in a week could reduce the total lead time of this stage by at least 4 hours, in some cases even by 19 hours.

As a result, the production rate of the anodising stage will go up by 10%, and a significant increase in equipment utilisation and reduction of unit manufacturing cost can be achieved.

Decorpart will save an amount equivalent to the total project costs in less than three months!! This project once again proves that often little investment is needed to test and optimise an operating planning too by simulation. Model based analysis can help discover enormous potentials for improvements and saving.

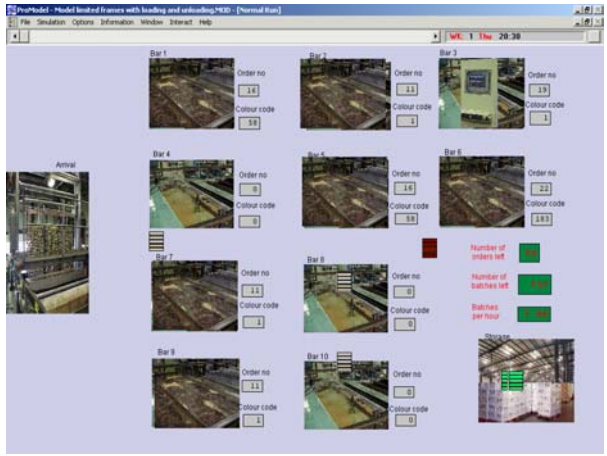

Figure 2: The anodising process stage sub-model

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4. Example: Simulation Based Scheduling of Car Painting

Today nearly every car in automotive production is different because of specific customer requirements. In the production step of painting, more than 100 different colours are possible. Combined with different car shapes like standard or station wagon, engine varieties and other options, the problem of finding optimal product sequences is extremely difficult.

In contrast to the assembling process, where tools and process steps are very similar and uncritical in sequence, the large number of colours is critical:

- Each colour change requires a cleaning operation consuming considerable extra time and cleaning supplies.
- The cleaning process is easier and faster if the colours are changing all time from a bright to a darker colour.
- The buffers in front of and behind the painting station are limited in space.

Therefore an optimised sequence of painting operations must be calculated, which meets the buffer restrictions and minimises the consumption of resources and time due to colour changes. An improved batch sequence can lead to major savings in costs and time ([6]).

A graphical process model was developed. It was very helpful in internal discussions among the manufacturer's staff, and in discussions with the external simulation experts. The validated model was integrated with other IT systems so that the model always reflects the actual state of the real process. To generate and optimise schedules which satisfy all constraints, an intelligent optimisation toolkit ISSOP was then coupled with the simulation model as shown in the diagram below:

The optimiser ISSOP generates production sequences, the simulation tool uses them as input, it checks if all constraints are met and calculates the costs and throughput time. ISSOP then compares the results and generates better sequences; the simulation model evaluates them again, and so on. After some iterations, which take between 5 and 25 minutes, an improved sequence has been found which is then used for controlling the real process.

This approach increases the reliability of planning, reduces material consumption, throughput times and work in progress. Additional advantages of the simulation model are the possibility of testing the schedule against disturbances such as technical problems or delivery delays.

Although production sequences were already calculated by software programs before, the results achieved by the new simulation & optimisation approach were significantly better:

- 8% less changes of colours in the painting station,
- in result of less colour changes and more optimised batch sequence 12% higher output of the painting station,
- less losses of coating material ,
- less cleaning material needed and less critical situations because of less manual operations.

In result of the saved material and time the Pay-Back Time was relatively short – about 8 months only. Annual Savings were about 12% compared to the time before.

Now, the tool is used regularly by the staff operating the painting station. Changes of the production schedules or new options of the painting process can be defined by the manufacturer's planning staff without any knowledge of the underlying simulation and optimisation techniques. Full integration with other IT-systems supports a fast and efficient data exchange

for an up-to-date optimisation of schedules for the next days or weeks. The staff also uses the tool to find adequate reactions to any disturbances of the process.

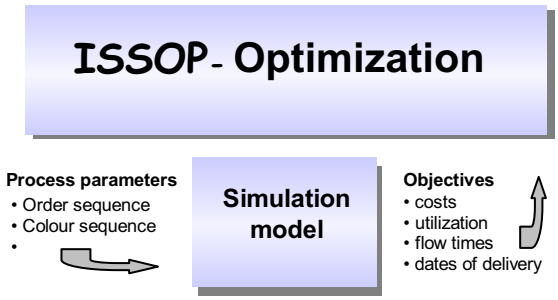

Figure 3: Interaction of Simulation and Optimisation Tool for car painting

5. Example: Optimisation of Planning and Scheduling In a Factory Producing Pre-fabricated Parts for Houses

A Dutch company produces pre-fabricated concrete part for houses. The production steps for the parts are predefined. All parts (=orders) have their own individual due dates. To improve the throughput, the company wants to implement a new system for production scheduling and control.

Cycle times on all machines as well as all transportation times were fixed (parts can have a weight of some tons!). They had installed a SCADA type system, which automatically recognizes the production times and locations of the parts on their way through production. There are fixed plans and due dates for each part, but the work stations (one of 100 stations) in the factory, where production actually takes place, vary ([7]).

Figure 4: The production process

The main question was: can we optimise the process while production is working?

First, a simulation model had to be built. This model should hint at some “problem points” of the factory – providing a better overview than reality does, and allowing for changes and experiments which do not disturb the ongoing production.

After offline optimization, the company was also interested in an online optimization tool: Whenever a new order comes in (for a new part), the operator should be able to re-schedule in short time.

To simplify and speed up, it was decided to improve scheduling only by a re-sorting at the very beginning of the production process. During one day about 50 parts were produced. For a schedule of two weeks, 500 parts were to be sorted.

They decided to use our modelling and simulation tool SIMUL_R+ mainly because

- they needed an open solution, which could interface to the software already available
- they needed a fast simulation tool for online re-scheduling

For optimization the method of “evolution strategies” was selected. The great advantage of this method is, that it is very robust, which means, that it will find an optimum under almost any circumstances.

A number of offline simulation runs – considering order-sequences of the last year – delivered “optisets”, which were stored in the database, as good starting points for online optimisation runs.

Additionally during optimization the tool outputs the decrease in the throughput time, absolute in seconds and in percentage, to the operator. He can stop optimization at any time and accept (or not accept) the best solution so far, which then optionally is returned to the directing stand and used as new sequence for fabrication or simply recorded as a new optiset.

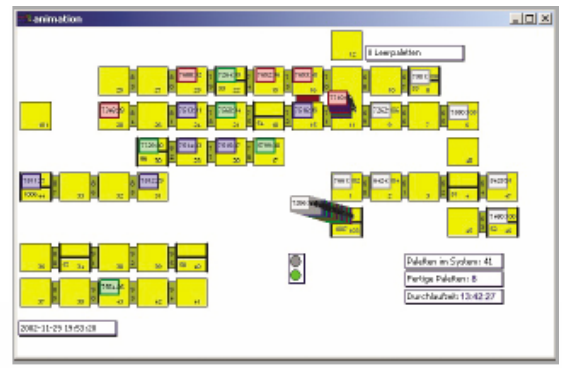

Figure 5: Animation Model of the Plant

Online simulation and optimization is now a fully integrated tool for the all-days work of the factory operator. By only using this simulation and optimization environment – without any changes to the production lines itself! -, they reached

- an average increase in productivity of 3%,
- which means about 1-2 parts per shift
- and up to one hour per day of faster production in certain cases.

Conclusion

The examples clearly show which improvements large as well as small and medium-sized enterprises can achieve by using simulation and optimisation tools for production planning and scheduling. These tools are very flexible and can solve an extremely wide range of optimisation problems. They can handle virtually any technical or economic constraint or objective. Experience shows that introducing such tools normally pays off within a few months.

Whether these tools are used stand alone or as support of existing MRP /ERP systems depends on the user company's situation and needs. Both solutions are possible. Also it should be checked in each case if an online integration with tools such as SCADA makes sense.

It should be emphasised here that simulation models can often be used for multiple purposes: Above we already presented two ways of using them for optimisation of production planning. Besides, they are very often used for designing or improving existing production facilities. Models developed for the purpose of evaluating or optimising the structure of a manufacturing plant can also be used for optimal planning and operation of this plant ([9]).

The synergy caused by this multiple use of simulation models will gain importance in the future: The borderline between plant design and operation is vanishing. More and more often plant managers are confronted with the problem to decide if a given challenge, e.g. a change of demand, can be met by just running the existing system in a more efficient way, or if a more efficient system is needed. Simulation models are ideal tools to find the right answer.

Further information regarding simulation and optimisation based production planning, scheduling and control, or about simulation in general, can be found on Sim-Serv's website www.sim-serv.com. Sim-Serv's Help Desk and its Local Contact Points are available for free and neutral, vendor-independent advice (10). They provide in-depth consultation and help analyse the current situation, find solutions and implement them successfully Contact details of the Help Desk and of Local Contact Points can also be found on the Sim-Serv website.

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Simulation as a Basis for Detailed Planning – Comparing Different Simulation Tools

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… compares and evaluates three simulation software tools for detailed production planning,
… makes use of various controversial criteria, as user friendliness and runtime efficiency, graphical modelling and database driven automatically modelling, etc.,
… and concludes, that a high-level simulator cannot compete with the runtime efficiency of a programming language, but that both may be needed in a project.

Abstract

Choosing the right software tool for discrete event simulation requires due consideration. When dealing with complex production processes where short response times are needed, not only functionality and user friendliness have to be considered, but also runtime plays an important role. In this article, three software tools are compared with respect to these criteria, based on a model of a shop floor production process that is to be used for detailed planning. The conducted studies suggest that a high-level simulator (while much more user-friendly) cannot compete with the runtime efficiency of a general-purpose programming language.

Introduction

For the purpose of detailed planning in a shop floor production process, for each machine a precise sequence of operations has to be generated. In order to rate different schedules for complex production processes (including issues like sequence dependent setting ups or product dependent allocation rules), a model of the involved operations and activities based on discrete event simulation is used more and more often nowadays. For this purpose, several sequences are determined either ad hoc by means of dispatching rules or in advance by a schedule. With the help of the simulation model, these schedules may be tested with respect to throughput, adherence to delivery dates and workload (and others). By this, a (nearly) optimal schedule may be found w.r.t. different strategies or individual weighting of key performance indices.

Therefore, the runtime of the developed simulation model is even more important than functionality and user friendliness of the simulation tool in question: As mentioned above, a schedule optimization (e.g. with the help of Simulated Annealing or any other meta heuristic) requires the computation of countless different schedules, which have to be compared with each other. Hence, single simulation runs must be as fast as possible. As explained more thoroughly in [1], a rather abstract model of a general production process was designed, which permits the application of the developed simulation model in many similar situations (by making only slight modifications).

The model was implemented with the help of three different simulation tools: eM-Plant, AnyLogic and C++SIM. The investigated tools range from a high-level simulator for production and logistics to a hybrid, general-purpose simulator to a discrete simulation library for a general-purpose programming language. These three simulation tools are compared with respect to functionality, user friendliness and runtime efficiency.

The basic model

The model deals with a production process where the goods are not manufactured in a single assembly line. There are rather a number of production steps (operations) for each product, which have to be undertaken on one of several possible machines. Thus, as mentioned before, it is necessary to define a sequence of operations for every machine.

In other words, the sequence of operations is not determined by the model layout, but rather by ordered lists of operations, etc. However, since the model was designed in a rather abstract way, neither the manufacturing master nor the operating data should be stored in the model file itself. Yet, they are both essential for a simulation of the production process. Thus, they are stored in and retrieved from a database for which a data model (in terms of database theory) was designed in [1]. Similar to the approach in [2], the model is then set up during initialization mostly automatically by generating and configuring the machines based on the data in the database.

After this initial setup, an arbitrary number of simulation runs can be conducted. Right before the start of each simulation run, all information on current orders (and on the schedule, if any) is imported from the database as well. After each run, the results concerning lateness and flow time (among other things) are written to the database. This information can then be used by an optimization algorithm in order to improve the schedule, restart the simulation, and so on.

eM-Plant 7.0

The software eM-Plant [3] is an object-oriented simulation tool used for simulation in production and logistics. Formerly known as SIMPLE++, it is distributed by Tecnomatix under its current name since the early 1990s.

For easy model build-up, a graphical user interface along with a large variety of predefined components (such as source, sink, queue, server, etc.) is offered. Further model configuration is made possible with the help of a programming language called "SimTalk", whose syntax is similar to the one of Pascal or Basic. The existing building blocks can be further parameterized by certain predefined parameters. Furthermore, they may be used as a base class for user-defined, similar blocks. Finally, all these blocks (whether predefined or not) can be used to build user-defined "networks". During a simulation run, the entities are routed through these networks, invoking entrance and exit controls, spending time at processing stations, etc.

It is also possible to use the data in a database for the parameterization mentioned above. For this purpose, eM-Plant implements the ODBC interface. What is more, a data structure called TableFile can be used for storing data in a tabular format. Therefore, whole tables from a database can be imported during the initialization phase, and can be stored in the eM-Plant model file. Thanks to this useful data structure, it is possible to execute the simulation model without re-reading all data from the database every time.

However, eM-Plant lacks some other data structures that are available in several other object-oriented languages, such as an AVL tree. This may result in longer search times, as it is the case in the discussed model. Moreover, some concepts of object orientation, such as overloading methods, are not supported by eM-Plant.

For the purpose of model verification, on the other hand, eM-Plant offers a powerful debugger. For instance, it enables the user to execute the event list step by step. What is more, it is also possible to execute one line of SimTalk code at a time. Additionally, one may place breakpoints at any event or on any line in the code, and inspect (or even change) every local or global variable.

However, as SimTalk is an interpreted language, a syntax check is only performed at runtime. Furthermore, this syntax check is quite limited: For instance, every predefined component as well as every network has the type "Object". Thus, it is impossible to distinguish between, say, a queue and a TableFile without checking for the exact class name.

AnyLogic 5.2.0

The Java-based simulator AnyLogic [4] is developed by XJ Technologies (St. Petersburg, Russia). It supports continuous, discrete as well as hybrid simulation, and uses UML-RT (Unified Modelling Language RealTime). As in eM-Plant, a graphical user interfaces facilitates working with this simulation tool, and several predefined components are again available. In this case, these building blocks are even open source, and can therefore be adapted to the user's needs. However, the basic functionality offered by these elements is not as large as the one of the components in eM-Plant. Still, as AnyLogic is based on Java, the full range of Java methods is available for building user-defined blocks (called "active objects") which offer the desired functionality. Thanks to UML-RT, one may also use state charts to model different states of an object.

Just like eM-Plant, AnyLogic uses the ODBC interface for connecting to a database. However, several runtime tests have shown that the performance of this interface is not satisfactorily to the full extent. Therefore, one should use a native JDBC driver for connecting to a database (if there is one available for the database in question). For storing the results of database queries, the Java class ResultSet is used. As this class is not as convenient as the TableFile in eM-Plant, it is advisable to transfer the retrieved data to user-defined data structures. This approach also permits the use of the appropriate data structures such as AVL trees, linked lists, etc. However, for using generic data structures (such as integer vectors or lists of type double, etc.), the user is required to download the newest Java version, Java 1.5, him- or herself, as AnyLogic 5.2.0 is distributed with Java 1.4.2.

For the purpose of debugging the model, AnyLogic offers a basic debugger. While it is possible to view all scheduled events, break points may only be set at certain model elements (such as transitions between different states in a state chart, or connectors between two active objects). Debugging the Java code line-by-line is not supported. However, one is encouraged to use a third-party debugger, which may support that feature.

Finally, performing several consecutive model runs – a task that is absolutely necessary for the purpose of detailed planning of a shop floor production process – is not as easily done as one would like it.

When restarting the simulation, all objects other than the root object are destroyed and created anew. Therefore, if any configuration of these objects is done programmatically (i.e. at runtime rather than at compile time), it has to be done before every single simulation run. Understandably, this procedure will result in longer runtime.

C++SIM 1.7.4

The package C++SIM [5] is an object-oriented simulation library for discrete, process-oriented simulation in C++, and was developed by members of the Arjuna-Project [6] at the University of Newcastle upon Tyne.

For the purpose of simulating different processes, systems threads are used. Several thread packages are distributed with C++SIM, enabling its use on a variety of platforms (e.g. Windows, Linux, Solaris 2 and SunOS 4).

As C++SIM is nothing more than a simulation package for C++, no graphical user interface is offered. Neither are any basic components (such as source, queue and server) predefined. Therefore, all these objects have to be developed by the user him- or herself, using the classes of the C++SIM package as base classes. This is of course rather tedious at the beginning. However, as soon as such basic components have once been designed, they may be used in all consecutive projects thanks to the object orientation of this C++ package.

Just like defining basic components, the problem of database connectivity is up to the user alone. Fortunately, C++ is a widely used programming language, and hence there are enough solutions for this problem available. In the present case, a MySQL database was used, and the appropriate MySQL C++ library was readily available. Still, some effort may be necessary to find an appropriate package in order to implement a database connection.

For debugging purposes, some simple debugging classes are provided which should facilitate the output of debug messages. However, it is advisable to use a professional C++ debugger which offers step-wise code execution and other convenient features.

Finally, the C++SIM package still has some minor flaws: Sometimes, the developed C++ program crashes when terminating the system threads used for simulating the different processes. However, this error could not be reproduced while using a debugger. Thus, its actual cause remains a mystery.

Case studies

For the purpose of runtime tests, two case studies where performed. In both cases, detailed planning with minimal response times is of utmost importance.

The first case study deals with a pressure casting factory, where 49 different products are first produced on one of seven pressure casting machines, and are then deburred on another machine. A period of one whole year with 700 orders of about 14500 items each was simulated.

For the second case study, a part of a semi conductor plant, which is also described in [7], was modelled. The 868 different products in question are manufactured in four to 45 steps on 185 different machines. The simulated time period is five months, and covers 816 orders totalling to 30159 wafers. A more detailed description of both processes can be found in [1].

All simulation models were executed several thousand times each. The average runtime of different parts of the simulation model are shown in the tables and figures below.

Table 1 shows the (average) duration of the initial setup of the model during which the machine objects are generated and configured:

	eM-Plant	AnyLogic	C++SIM
Case #1	608 ms	532 ms	140 ms
Case #2	16400 ms	2390 ms	1760 ms

Table 1: Average duration of initialization

eM-Plant and AnyLogic do not match the runtime efficiency of C++SIM during model setup. However, as this initialization has to be done only once for an arbitrary number of consecutive simulation runs, these differences should not be overrated.

More interesting and more important is the runtime of the simulation itself. The runtime results are shown in Table 2 and Figure 1(a) and 1(b), respectively. In this case, reading from and writing to the database was not taken into account:

Case study		eM-Plant	AnyLogic	C++SIM
#1	Dispatching	926 ms	209 ms	32 ms
	Scheduling	628 ms	229 ms	30 ms
#2	Dispatching	10910 ms	15630 ms	425 ms
	Scheduling	7030 ms	15280 ms	302 ms

Table 2: Average duration of the simulation itself

In the case of the core simulation itself, the superiority of C++SIM as far as runtime is concerned is most obvious: It is 6.6 times to 50 times faster than the other two simulation tools.

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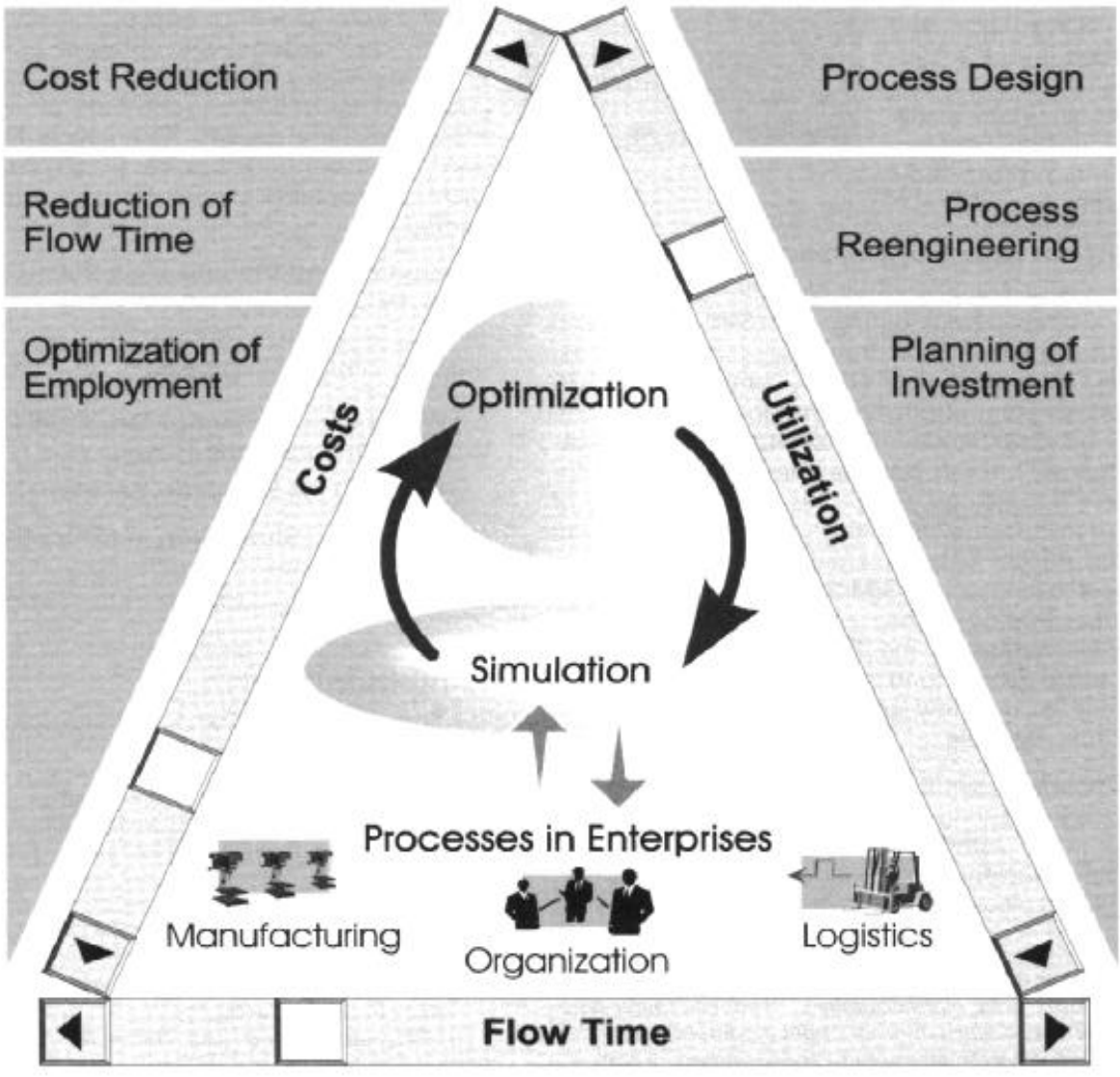

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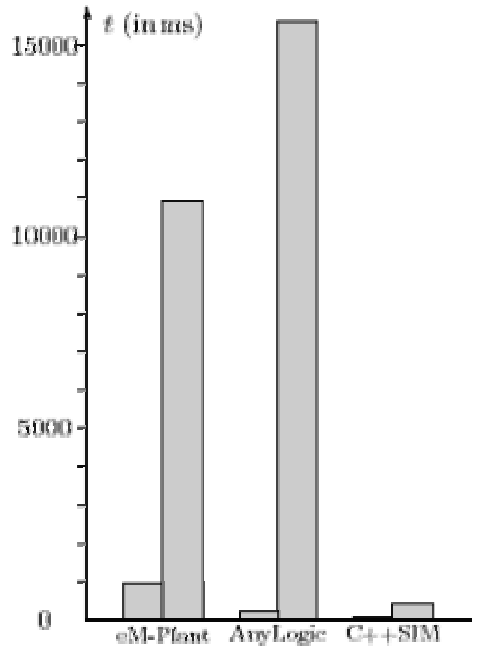
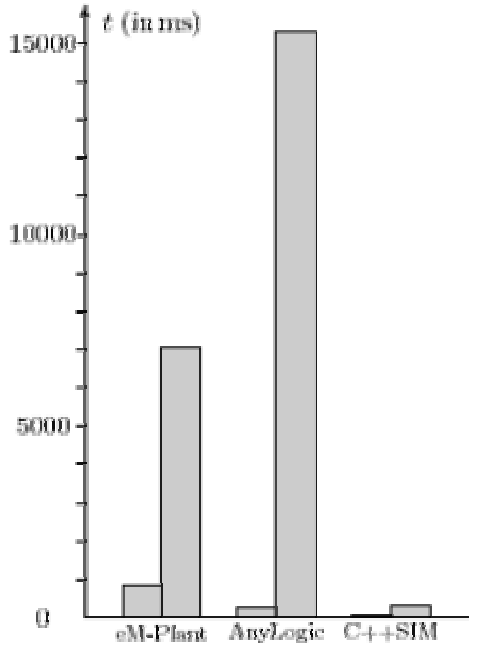
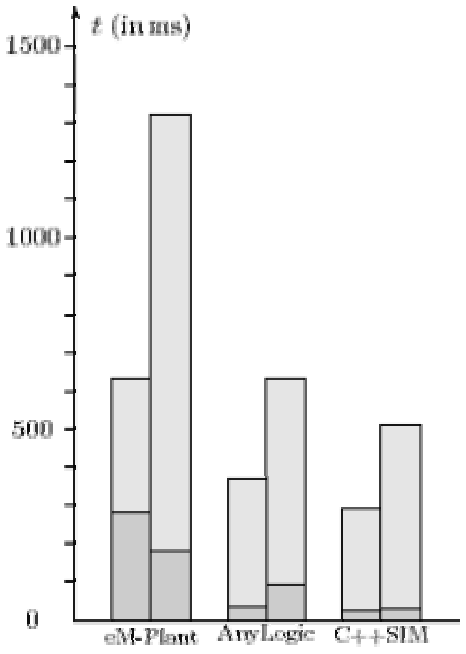


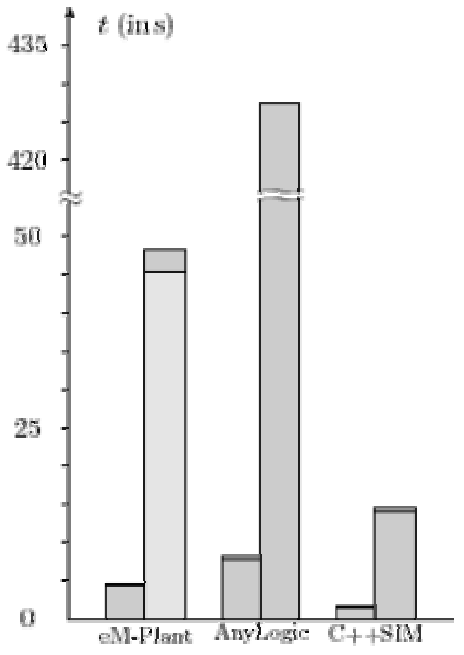
(a) Dispatching



(b) Scheduling



(c) Reading order and schedule data



(d) Total duration

Figure 1: The diagrams show the runtime of selected parts of a simulation run.
The left and right bars of each pair represent the runtime of the first and second case study, respectively.
In Figure (c) and (d), the darker bars correspond to the runtime in the case of dispatching
and the lighter ones to the runtime in the case of scheduling.

In other aspects, the runtime difference is not as significant as above, but still remarkable. Figure 1(c) and Table 3 serve as an example for this fact: In Table 3, the average duration of writing the lateness and flow time of each order to the database can be found. Figure 1(c) shows the average duration of reading order (and schedule) data from the database, both for the dispatching as well as the scheduling case. The runtime difference between these two cases is due to the fact that in the former case, no schedule data has to be read from the database.

	eM-Plant	AnyLogic	C++SIM
Case #1	448 ms	528 ms	331 ms
Case #2	489 ms	615 ms	323 ms

Table 3: Writing lateness and flow time to the database

Finally, Table 4 as well as the diagram in Figure 1(d) show the average total duration of a simulation run (including the initial model setup and writing the results to the database):

Case study		eM-Plant	AnyLogic	C++SIM
#1	Dispatching	4.30 s	7.76 s	1.52 s
	Scheduling	4.51 s	8.11 s	1.79 s
#2	Dispatching	48.06 s	427.25 s	14.07 s
	Scheduling	45.32 s	427.44 s	14.43 s

Table 4: Average total duration

As one can see, the simulation with C++SIM is clearly the fastest. However, the other two simulation tools are also able to achieve quite acceptable results in most cases.

Determining the "winner"

Despite quite thorough investigations, there is no definite "winner", as none of the simulation tools in question is flawless in every extent. Therefore, the main aspects shall be pointed out rather briefly:

A toolbox of predefined components facilitates a fast and easy model build-up. The toolbox of eM-Plant is definitely the most sophisticated one. The so-called "Enterprise Library" of AnyLogic might not be as extensive in comparison with eM-Plant. Still, it offers the basic functionality of the most important building blocks. The package C++SIM, on the other hand, is the only one that does not have any comparable feature.

However, not only the amount of available predefined components is important, but also the flexibility for programming user-defined ones.

In this regard, AnyLogic and C++SIM are able to benefit from the vast flexibility of Java and C++, respectively. In comparison, the language SimTalk of eM-Plant is rather limited.

As far as debugging capability is concerned, all three simulation tools are comparable, provided that professional third-party debuggers for Java and C++ are available.

Finally, eM-Plant and AnyLogic cannot compete with C++SIM with respect to runtime efficiency, especially in regard to the core simulation itself.

Conclusions

A model of a rather abstract production process has been designed and described rather briefly. This paper mainly focused on the implementation of the model in three different simulation tools and on their respective advantages and disadvantages.

All in all, the two simulators eM-Plant and AnyLogic are without doubt more user friendly than C++SIM thanks to their graphical user interface and many pre-defined components. However, when modelling a shop floor production process for the purpose of detailed planning (where last but not least runtime requirements are a decisive factor), the higher effort of using a high-level, general-purpose programming language does indeed pay off.

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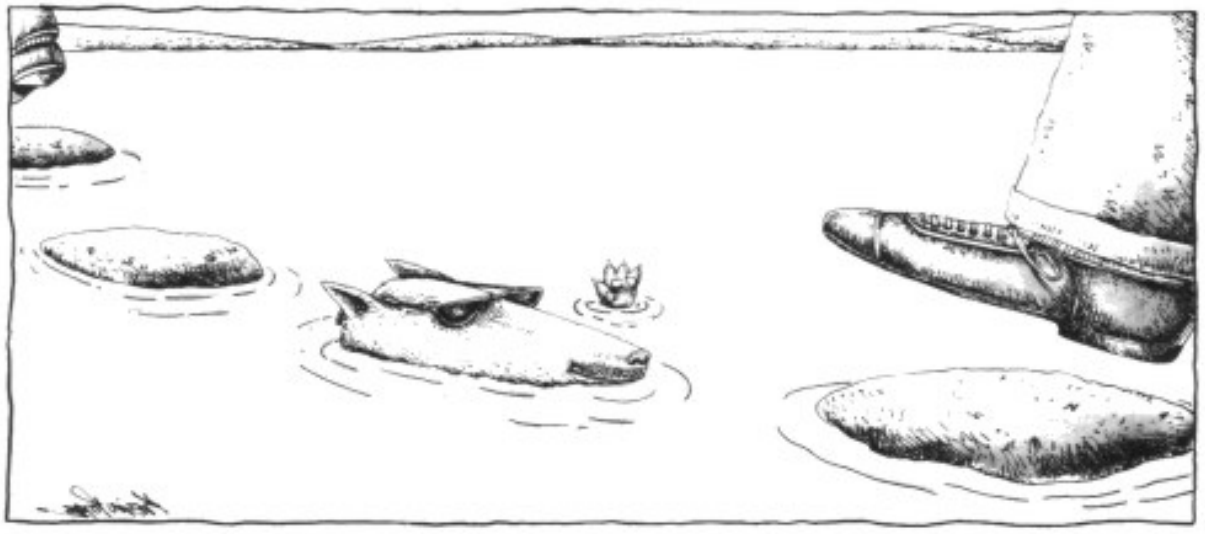

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SHORT NOTES

Comparison of Ideal and SPICE Switches for Electronic Circuit Simulation

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… compares the ideal switch model with the nonlinear switch model from SPICE,
… presents analytical and numerical investigations and results of both models,
… and concludes, that the ideal switch model has to be favoured, if implemented carefully in a simulation system.

Introduction

Electronic components (transistors, thyristors, and diodes) are often, for convenience, modelled as switches. Instances of such models may be found in switched capacitor or switched-current networks, switched power supplies, mixed signal circuits such as A/D converters etc. The advantage of using ideal switches in circuit simulation is explained in [3].

To simplify, if nonideal models are used in a SPICE-like simulation, simulation of the resulting stiff system demands long simulation times. When switches are modelled as ideal, simulation for the switch transition is performed in one time instant, rather then as a set of transitions of voltages and currents. It saves simulation time without noticeable difference in the simulation results.

Nonlinear Ideal Switch Model

Limitations of the Usual Ideal Switch Model

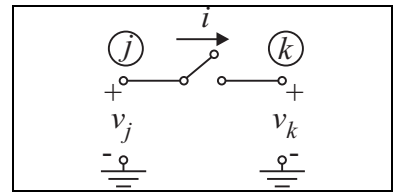
A closed switch, connected between nodes *j* and *k* is modelled as a zero-valued voltage source:

$$v_j - v_k = 0 \tag{1}$$

If the switch is open, the model is equivalent to zero/valued current source:

$$i = 0$$

where *i* is the current through the switch, flowing from the node *j* to node *k*, as depicted in Fig. 1(a)



a)

	v_j	v_k	i	rhs
j			1	
k			-1	
z	1	-1		

b)

	v_j	v_k	i	rhs
j			1	
k			-1	
z			1	

c)

Figure 1: Simplified ideal switch (a) and stamps representing model of the (b) closed, and (c) open ideal switch. The right hand side vector of the system of equations is denoted as rhs.

It would seem that one could replace one stamp by another when the switch transition occurs. Unfortunately, this leads to numerical problems in a SPICE-type program, since the switch transition changes the network topology, and this is reflected in the change of the structure of the nonzero entries in the system matrix. If such model were implemented, a new reordering and pivoting in the matrix would be necessary after every switch transition.

Nonlinear Model of the Closed Switch

Our first concern is to define the switch model that would have the same structure of nonzero entries for both states [1,4]. Let us first consider the closed switch. The problem here is that the zero entry appears on the main diagonal of the matrix. However, for circuit simulation (1) can be replaced by

$$(v_j - v_k) - r \cdot i = -r \cdot i^m \tag{3}$$

where r is a new model parameter with dimension of resistance. Superscript m denotes iteration number, and i^m denotes the value of the current obtained in the previous iteration. When convergence is reached, the current in $(m+1)$th iteration equals that from m th iteration:

$$i = i^m \tag{4}$$

and one obtains the equation for the closed switch (1).

Convergence is faster when lower values or r are used. Nevertheless, too low value of parameter r could lead to numerical problems. We have found the value of $10^{-5}\Omega$ enables fast convergence and is high enough to avoid numerical problems.

The stamp describing the model is given in Fig. 3(a) and there is no zero on the main diagonal. The whole transition of the switch is performed as an iterative process in one time instant.

	v_j	v_k	i	rhs
j			1	
k			-1	
z	1	-1	$-r$	$-r \cdot i^m$

a)

	v_j	v_k	i	rhs
j			1	
k			-1	
z	1	-1	$-R$	$v_j^m - v_k^m$

b)

Figure 2: Stamps implementing the nonlinear model of (a) closed switch and (b) open switch.
The structure of nonzero entries is the same in both cases, and no zero main diagonal entries are generated.

Nonlinear Model of the Open Switch

For the open switch we introduce a new model

$$v_j - v_k - R \cdot i - v_j^k - v_k^m \tag{5}$$

where R is a model parameter with the dimension of resistance. When convergence is reached, the voltages from $(m+1)$th and (m)th iteration are equal

$$v_j = v_j^m, \quad v_k = v_k^m \tag{6}$$

and from (5) one obtains (2) which models the open switch.

The convergence will be reached in smaller number of iterations if R is higher, but too high value could lead to numerical problems. We found the value of $10^9\Omega$ as most convenient.

With these choices of values r and R, the number of iterations necessary for convergence of nonlinear switched networks is not affected by our switch model, it is determined by other nonlinear devices in the network.

The stamp that corresponds to the model (5) is given in Fig. 2(b). The structure of the nonzero entries in the stamp is the same for both switch states.

Considering the fact that any circuit containing ideal switch is nonlinear, this model for the ideal switch is applicable in a general-purpose time-domain circuit simulation program. The switch is considered as circuit element and used by routine as simple as any other circuit element. Important properties of this model are the effectiveness and its versatility [6].

SPICE Nonideal Switch Model [5]

SPICE does not allow for ideal switches. Accordingly, the voltage-controlled switch (Fig. 3.) is a special kind of voltage-controlled resistor. Model parameters are given in Table 1. The resistance between switch nodes (N_+ and N_-) depends on the voltage between the controlling nodes (N_{C+} and N_{C-}). The resistance varies continuously between the ON value (R_{ON}) and OFF value (R_{OFF}). Resistance is calculated according to equations (7) and (8)

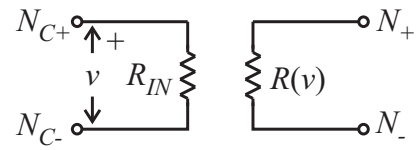


Figure 3: SPICE voltage controlled switch model.

Name	Description	Units	Default
RON	"on" resistance	Ω	1.0
ROFF	"off" resistance	Ω	1E+6
VON	control voltage for "on" state	V	1.0
VOFF	control voltage for "on" state	V	0.0

Table 1. SPICE voltage controlled switch model parameters

In the following equations:

V_C = voltage across control nodes

L_m = log-mean of resistor values = $\ln\left(\sqrt{RON \cdot ROFF}\right)$

L_r = log-ratio of resistor values = $\ln(RON/ROFF)$

V_m = mean of control voltages = $(VON + VOFF)/2$

Vd = difference of control voltages = $VON - VOFF$

If $VON > VOFF$ the switch resistance R_S is

$$R_S = RON, \quad \text{for } V_C \geq VON$$

$$R_S = ROFF, \quad \text{for } V_C \leq VOFF$$

$$R_S = \exp\left(L_m + 3L_r\,(V_C - V_m)/(2V_d) - 2L_r\,(V_C - V_m)^3 \,/\, V_d^3\right) \quad \text{for } VOFF < V_C < VON \tag{7}$$

If $VON < VOFF$ the switch resistance R_S is

$$R_S = RON, \quad \text{for } V_C \leq VON$$

$$R_S = ROFF, \quad \text{for } V_C \geq VOFF$$

$$R_S = \exp\left(L_m - 3L_r\left(V_C - V_m\right)/\left(2V_d\right) + 2L_r\left(V_C - V_m\right)^3 \Big/ V_d^3\right)$$
$$\text{for } VOFF > V_C > VON \qquad (8)$$

A resistance of 1/GMIN (GMIN is simulator parameter with default value of 10^{-12} S) is connected between controlling nodes to keep them from floating.

Making the ratio between ROFF and RON greater than 10^{12} is not recommended because of possible numerical problems. Similarly, it is not recommended to make the transition region too narrow. In the transition region the switch has gain. The narrower the region, the higher the gain and greater the potential for numerical problems.

A general property of this model may be stated as follows. Although very little time is required to evaluate switches, during transient analysis, simulator must step through the transition region with fine enough step size to get an accurate waveform. So, for many transitions, simulation run times may be long from evaluating the other devices in the circuit many times.

Comparison Example

Both Ideal switch model and SPICE nonideal switch model were implemented as built-in elements into Alecsis [7] simulator.

In order to estimate the speed-up of the simulation run time obtained with the ideal switch compared to the nonideal switch, SC filter circuit (Fig. 4.) was simulated. The SC filter circuit is excited through a sample and hold circuit, shown in Fig. 5. Simulation results are shown in Fig. 6.

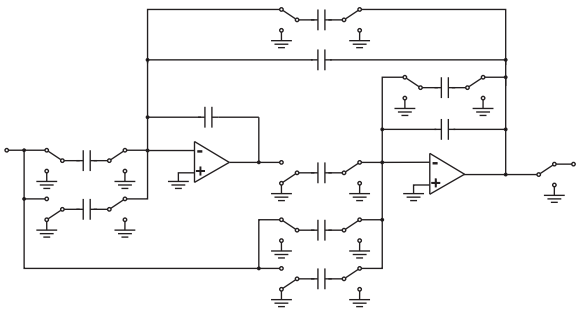


Figure 4: SC filter circuit

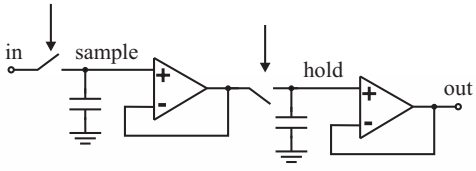


Figure 5: Sample and Hold circuit.

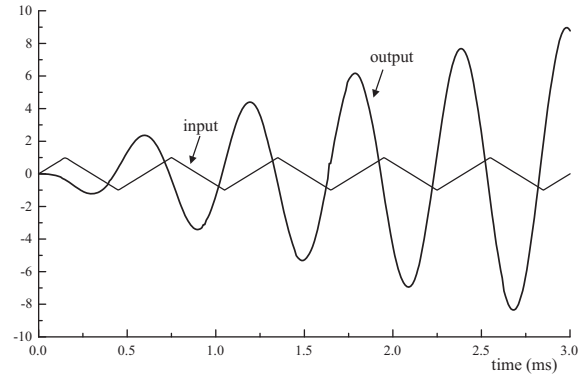


Figure 6: Simulation results for SC circuit excited by triangular input signal.

Operational amplifiers were modelled with input resistance of $10^6\,\Omega$, output resistance of 10Ω and gain of 10^5. Switches were controlled by the 128kHz 1V sine-wave signal. Parameters of the SPICE nonideal switch model used were: $RON = 10^9\,\Omega$, $ROFF = 1\Omega$, $VON = VOFF = 0$ V. Reducing the $RON/ROFF$ ratio and increasing the $VON - VOFF$ difference further increased the simulation run-time. Default SPICE tolerances were used.

The simulation run-time for the ideal and nonideal switch model is 1.16 s and 16.83 s, resp. It can be noted that the speed-up of almost 15 times was gained with the use of ideal switch model.

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Petri Net Modelling and Simulation in MATLAB – A Petri Net Toolbox

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… sketches briefly theory for Petri nets, from state/transition nets to timed Petri nets,
… presents a MATLAB toolbox for building, analysing, and simulating Petri net models,
… and shows improvements in handling conflicting firing sequences and in documentation.

Introduction

Petri nets are a powerful mathematical modelling tool [5]. Many different extensions of classical Petri nets exist, and these are able to model a variety of real systems. In particular, timed Petri nets can be used to model and analyze a wide range of concurrent discrete-event systems [1]. Several previous studies have addressed the timed Petri-net-based analysis of discrete-event systems, including FMS ([5]).

A Petri-net can be used to analyze the modelled system. Properties, such as reachability, deadlock, safety, and hazards, etc. can be analyzed, verified and validated. When time is integrated into Petri net models, quantitative performance indices, such as cycle time, production rates and resource utilisation, can be derived and evaluated.

Timed Petri nets

The concept of time is not explicitly given in the original definition of Petri nets. However, for the performance evaluation and scheduling problems of dynamic systems it is necessary to introduce time delays. Given that a transition represents an event, it is natural that time delays should be associated with transitions. Time delays may be either deterministic or stochastic.

As described in [1], there are three basic ways of representing time in Petri nets: firing durations, holding durations and enabling durations. The names given to Petri nets augmented with time vary greatly from one researcher to another. Holding durations are used in this work to implement time in Petri nets. This principle works by classifying tokens into two types, available and unavailable. Available tokens can be used to enable transitions, whereas unavailable tokens cannot. To each transition time duration is assigned, and when firing occurs, the action of removing and creating tokens happens instantaneously.

However, the created tokens are not available to enable new transitions until they have been in their output place for the time specified by the transition that created them.

By using holding durations the formal representation of the timed Petri net is extended with the information of time. A *TPN* with *u* places and *v* transitions can be represented by the multiple $TPN=(P,T,I,O,f,s_0)$, where

- $P=\{p_1, p_2, \ldots, p_u\}$ is a finite set of places,
- $T=\{t_1, t_2, \ldots, t_v\}$ is a finite set of transitions (with $P \cup T \neq \emptyset$ and $P \cap T = \emptyset$),
- $I: P \times T \rightarrow \mathbb{N}$ is the input arc function. If there exists an input arc with weight *k* connecting p_i to t_j, then $I(p_i,t_j)=k$,
- $O: P \times T \rightarrow \mathbb{N}$ is the output arc function. If there exists an output arc with weight *k* connecting t_j to p_i, then $O(p_i,t_j)=k$,
- $f: T \rightarrow \mathbb{R}_0^+$ is the time delay function which assigns a nonnegative real value $f(t_j)$ to each transition $t_j \in T$,
- s_0 is the initial state.

A state of a timed Petri net is a triple of functions, one of which describes the distribution of available tokens in place, the second the distribution of unavailable tokens and the third one is the remaining-holding-time function [4]. A state of a timed Petri net is a triple $s=(m,n,r)$ where,

- $m: P \rightarrow \mathbb{N}$ is a marking function of available tokens, *m* defines an *u* x 1 column vector whose *j*th entry is $m(p_j)$,
- $n: P \rightarrow \mathbb{N}$; a marking function of unavailable tokens, *n* defines an *v* x 1 column vector whose *j*th entry is $n(p_j)$,
- *r* is a remaining-holding-time function which assigns the remaining holding time (timestamp) to each independent unavailable token in a place, i.e., if the rank of unavailable tokens in a place p_j is equal to *l*, $n(p_j)=l$, the remaining-holding-time function $r(p)$ defines a vector of l nonnegative real values denoted by $r(p_j)=[r(p_j)[1],r(p_j)[2],\ldots,r(p_j)[l]]$; *r* is a partial function and it is undefined for those places for which $n(p_j)=0$.

A transition t_i is enabled by a given marking if, and only if $m(p_j) \geq I(p_j,t_i)$ for all $p_j \in P$. The firing of transitions is considered instantaneous. Newly produced tokens receive the timestamps as prescribed with transitions that produced them. When no more transitions are enabled at the current time, the time is incremented and the values of timestamps are decreased until the token becomes available and enabling condition is satisfied again.

PetriSim Toolbox in MATLAB

At the Laboratory for Modelling, Simulation and Control at Univ. Ljubljana some years ago a Petri net toolbox was developed in MATLAB 5.3. This toolbox allowed to graphically model a classical state / transition net (STN), to analyse the model with respect to reachability, deadlocks, etc, and to simulate the net based on random firing sequences. Within a cooperation project with the Institute for Analysis and Scientific Computation, TU Vienna, this toolbox has been new designed and significantly extended (implementation in MATLAB 7.0.1). Figure 1 shows the user interface of the toolbox with a model of a production cell.

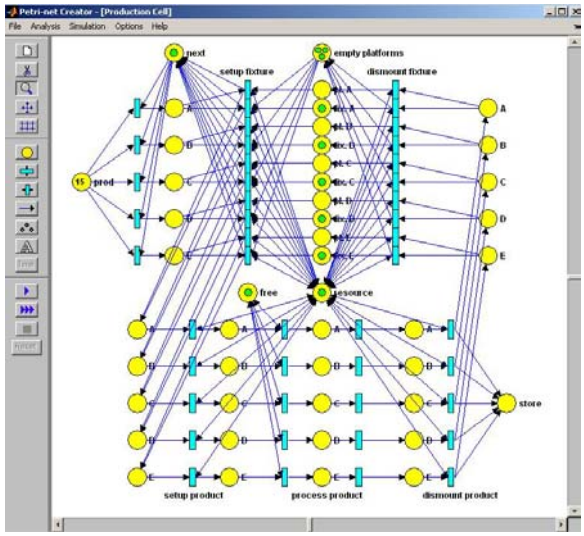

Figure 1: The Petri net editor in MATLAB

The main extensions of the new toolbox are:

- Introduction of time following the definition of a TPN given before
- Conflict resolution, priorisation, and definition of firing sequences for simulation of STN and TPN,
- and graphical evaluation of simulation of TPN

The toolbox offers three operation modes:

- Analysis of a defined STN: reachability, etc. is calculated via matrix functions, displayed in MATLAB
- Simulation of a defined STN: in the editor, the movement of tokens is displayed; the firing sequences are random or influenced by priorities
- Time-driven simulation of a TPN: in the editor, the movement of tokens is displayed; the firing sequences may be influenced by priorities and sequences, statistical results and Gant charts can be displayed separately.

Conflict resolution. A new conflict resolution method is added to the time simulation function.

Transitions can be selected and added to disjoint vectors. Afterwards a priority or a sequence can be specified to each vector of transitions.

Priority. A priority value can be set to each transition. If there is a conflict between at least two transitions the transition with the highest priority always will fire. If two or more transitions have the highest priority value it will be randomly decided which transition fires.

Sequences. A sequence vector can be defined to each vector of transitions, which are in conflict. The values of the sequence vector are pointers to the transitions in conflict, defining the favoured sequence. At the beginning of the simulation only the transition which is defined by the first value of the sequence vector will fire if all transitions are enabled. Then a so-called counter is increased and for the next conflict only the transition defined by the second value of the sequence vector will fire, and so on. When the end of the sequence vector is reached the next conflicts are solved randomly. To solve conflicts between transitions from different sequence vectors a priority value can be set to each transition. Transitions with a sequence vector are always higher prioritized than other transitions.

Gantt chart. A Gantt chart is a graphical representation of the duration of tasks against the progression of time. After the end of a timed simulation any place can be selected and a Gantt chart can be produced. Figure 2 shows the Gantt chart of a production sequence simulated in a production cell.

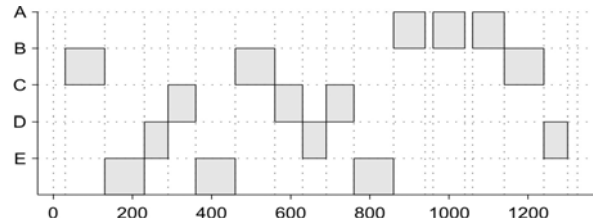

Figure 2: Gantt chart of production in FMS

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SOFTWARE NOTES

DESIRE – Open Software

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… announces DESIRE simulation software as Open Software under Linux,
… sketches briefly the primary features of DESIRE: ODE simulation, neural net simulation, but no DAE simulation,
… comments the development of Windows / .NET and of Linux distributions,
… underlines the belief in Open Software, giving Scilab/Scicos as good example,
… and concludes with future aspects for Linux teaching and for Linux-educated students.

The latest DESIRE simulation package, portable (and free, including a comprehensive manual and source code, under the General Public License) is beginning to run in Europe as well as in the US. This is convenient and fast for control-system applications, vectorised Monte Carlo simulations, and neural networks.

DESIRE's main limitation is that it will solve only differential equations and difference equations but not differential-algebraic (DAE) systems, which are needed for important mechanical and chemical engineering tasks.

I believe strongly in Open Software. I have lately begun to play with Scilab/Scicos. INRIA deserves great credit for making these excellent programs so easily available (I think Scilab is better than Octave, which is now included in most Linux distributions).

Among other things, Scilab/Scicos has made Mathworks work harder at what they do - which is what competition is for.

I do think that Windows - and the .NET development software were truly great contributions, but I find that Windows, with its ugly registry file and validation features, has become an unmanageable kludge, largely because of assorted efforts to keep it proprietary.

The latest Linux kernel and GNOME are becoming fairly easy to use, and Open Office is very powerful.

But Linux still is not yet ready for most non-experts. Linux (and especially KDE) is written by types who love tricks and improvements better than good help files, and they tend to leave the general public far behind.

This situation is improving and may change as commercial developers, who could charge relatively small fees for support and help (the GPL will not yet them charge for software), get behind Linux.

Red Hat and SUSE do that, but they are mainly interested in servers. Small versions of Linux like Lindows are, well, too small.

On the other hand, Linux is very suitable as a Solaris or AIX substitute for inexpensive and very powerful engineering workstations. In late 2004 I bought a more or less ready-to-go 64-bit workstation (AMD Athlon64 2.4 GHz 3800+, 1 Gb DDR, 160 Gb RAID, 60 Gb IDE, DVD and CD/RW, and a dual-monitor display) for only $1300 plus $200 for two 19" monitors. In 2005, two-processor machines will cost only a little more.

Altogether, more academic departments need to get behind this by simply using Linux for teaching. A clean Unix-type system has long been used to teach computer science, and we need a generation of students used to Open Software.

They will find good jobs developing business and city-government applications, too, including reasonably priced commercial package development.

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ARGESIM COMPARISONS

Identification of Nonlinear Dynamics – Neural Networks versus Transfer Functions - Definition of a New ARGESIM Comparison - C18

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This comparison studies alternative approaches for identification of the nonlinear dynamical relation between muscle force and muscle-belly thickening. Classical transfer function models and as alternative neural net models are to be compared.

The system is animal skeletal muscle, and measured are muscle-belly thickening, and muscle force. The aim is to identify a relation between the two measured signals in order to show that the two signals are related to each other.

The motivation for the study is the fact that muscle force cannot be measured non-invasively; therefore, an indirect non-invasive measurement is necessary to characterize the muscle force. Many muscle and nervous diseases manifest themselves in reduced muscle force or slowed-down muscle contraction/relaxation dynamics. The muscle force observations can also be used as a measure for athlete's condition. A possible marker for muscle force could be muscle-belly thickening measurements.

If a mathematical model can be composed that would take muscle-belly thickening as the input and would calculate the muscle force on the output then the relation between the two measurements exists and muscle-belly thickening measurements can serve as a marker for muscle-force.

Measured data characterisation.

Two data sets, measured on the same muscle type (gastrocnemius) taken from two toads (*bufo bufo*), were used in this comparison (see Figure 1 and Figure 2).

The data set from the first muscle is used for identification procedures and the data set from second muscle is used for validation purposes.

First, the data is filtered with low-pass filter and resampled at 100Hz sampling frequency to reduce the noise and to reduce the amount of data. Next, the data is characterized for dynamic/static properties using the phase plot (see Figure 3 and Figure 4).

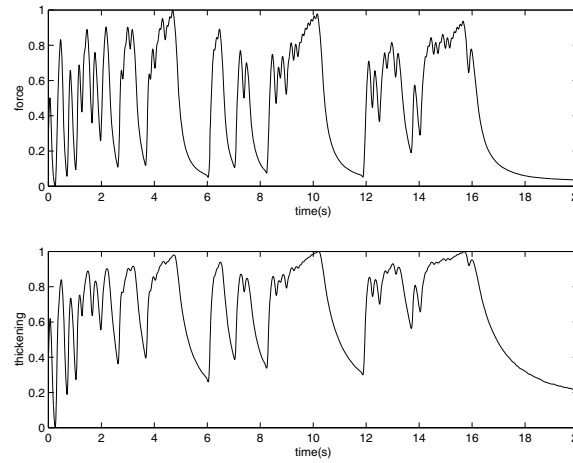

Figure 1: Measured thickening and force, first muscle.

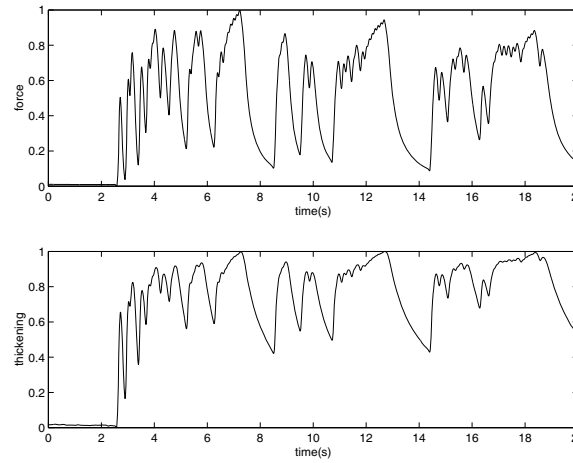

Figure 2: Measured thickening and force, second muscle.

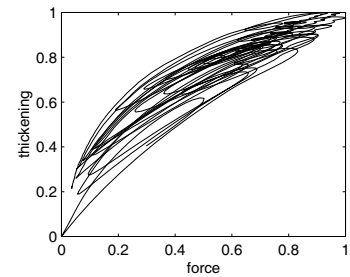

Figure 3: Phase plot of muscle-force and muscle-belly thickening for training data set.

In Figure 3 and Figure 4 irregularly shaped loops can be observed, which implies on non-linear dynamical system, therefore, a dynamical model should be composed.

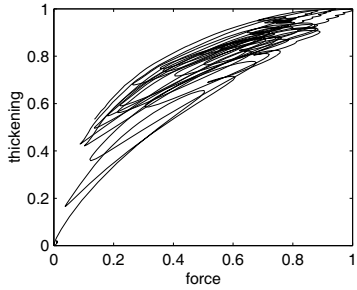

Figure 4: Phase plot of muscle-force and muscle-belly thickening for validation data set.

Task a: Identification with discrete linear dynamical model

First, identification with linear dynamical model (see Figure 5) should be tried.

Although, the analysis above suggests that the relation is non-linear, a linear model is always helpful for the analysis of the general properties of the relation.

As the system can be described as mechanical system that includes moving masses, second order model should be used with least-squares identification method.

Figure 5: Identification with discrete linear model. G(z) represents discrete transfer function.

Task b: Identification with linear dynamical model and artificial neural network (ANN) in parallel

The relation between muscle-belly thickening and muscle force can also be identified with parallel structure as seen in Figure 6. The difference between the simulated force, using dynamical linear model, and real system's measured response can be modelled with the ANN.

Thus a more precise prediction can be obtained. Discrete linear model covers the dynamical properties of the system, whereas the ANN covers the non-linear characteristics.

The proposed structure is useful when modelling dynamical and non-linear systems where linear models are not providing the prediction that is accurate enough, and ANN training algorithms have problems with training of the dynamical ANN structures due to the high complexity of the ANN.

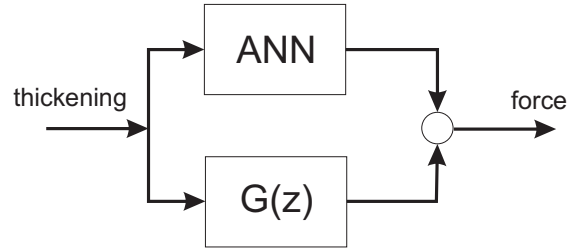

Figure 6: Discrete linear dynamical model in parallel with the ANN.

First, the linear dynamical model is identified with the least square method, than the ANN is trained to simulate the difference between the linear model simulation and real systems response.

Task c - Identification with a dynamical ANN

A dynamical ANN can be used to solve the problem as well (see Figure 7).

Figure 7: A neural network model.

In this case, the ANN's task is to cover the system dynamics as well as the non-linearity. The procedure is simpler than with the hybrid model, however, the training of the network is far more time consuming.

The structure of dynamical ANN is more complex than the one of static ANN, due to internal feedbacks, and repetitions of training do not necessary provide the same prediction quality of the ANN. Therefore, it is necessary to repeat the training several times, to obtain optimal results, which is time consuming.

Solutions: Clearly, this comparison addresses software, which is able to handle neural nets and / or model identification. The sample solution is implemented in MATLAB, using all necessary toolboxes, so that this solution is an easy solution. Nevertheless solutions using general purpose simulators or other CACSD tools are expected. Measured data to be used in this comparison can be downloaded from the ARGESIM webpage, where also this definition can be found.

Acknowledgement: The author wishes to thank dr. B: Boštjan Šimunič from Institute for Kinesiology, Science and Research Centre of Koper, University of Primorska, Slovenia, for providing the data as well as the problem.

A Toolbox – based Solution to ARGESIM Comparison C18 'Neural Nets / Transfer Functions' with MATLAB

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Simulator: MATLAB 5.3 (www.mathworks.com) with Neural networks toolbox, running on Debian Linux 3.0 was used to solve this comparison.

Task a: Identification with linear dynamical model: First identification with linear dynamical model was tried. MATLAB *arx* function was used and 2nd order discrete-time model was identified:

$$G(z) = \frac{0.5289z^{2} - 0.5206z}{z^{2} - 1.586z^{1} + 0.5985}$$

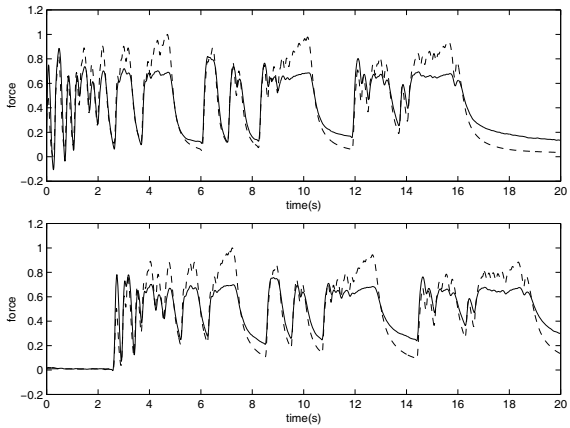

Figure 1: Simulated (solid line) in compare with measured force (broken line). Training data set – above, validation data set below.

Model simulation with respect to measured data is presented in Figure 1. As can be seen, linear second order model can describe the general system dynamics; however, the details are not matched.

Task b: Identification with linear dynamical model and the artificial neural network (ANN) in parallel. For this task, features of the Neural Network Toolbox were used.

In following MATLAB code, E represents the difference between real system's measurements T and linear model simulation y. Next, a network structure net is created with 7 neurons on the first layer and 1 neuron on the output layer, and is trained according to the system input P and target E. The network and the linear dynamical model are then simulated in parallel and the result of the hybrid system is shown in Fig. 2.

```
E = T-y';  net = ...
newff(minmax(P),[7,1],{'tansig','purelin'});
net1 = train(net,P,E);  y1 = sim(net1,P);
plot(t,y+y1',t,T,'--')
```

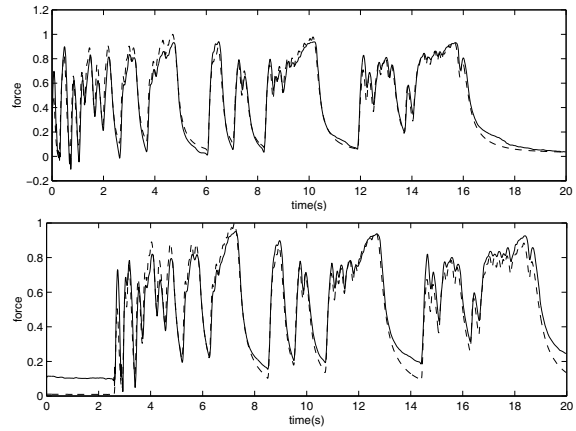

Figure 2: Simulation of the parallel structure of linear dynamical model and the ANN (solid line) in compare with measured force (broken line). Training data set – above, validation data set - below.

Task c: Identification with dynamical ANN. The following code shows again the use of the Neural Network Toolbox, especially for the ANN model training. The results are shown in Figure 3.

```
net = ...
newff([0 1],[10,1],{'tansig','purelin'});
net.layerconnect = [0 1;1 0];
net.layerweights{1,2}.delays = [1,2];
net.inputweights{1,1}.delays = [1,2];
net.trainparam.epochs = 50;
net.trainparam.show = 1;
net2 = train(net,con2seq(P),con2seq(T));
y2 = seq2con(sim(net2,con2seq(P)));
```

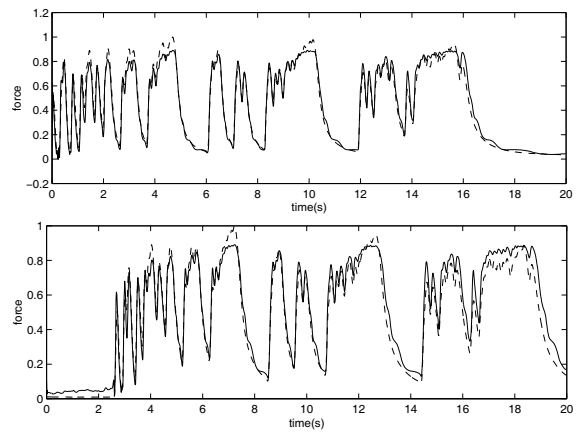

Figure 3 Simulation of the neural network model (solid line) in compare with measured force (broken line). Training data set – above, validation data set - below.

C17 Classification: Toolbox-based CACSD Approach
Simulator: MATLAB 5.3 (Linux) wit Neural Net TB

Petri Net Modelling of Different Strategies for ARGESIM Comparison C4 'Dining Philosophers' with MATLAB / PetriSim

Martin Kirner, Felix Breitenecker, Vienna Univ. of Technology; martin.kirner@gmx.at

Simulator: This comparison solution was performed with a MATLAB toolbox "PetriSim", which is freely available. This toolbox offers a GUI for modelling classical and timed state / transition Petri nets and three operation modes: net analysis (P/T invariants, coverability tree, etc.) for S/T nets, simulation with conflict resolution strategies for S/T nets, and time simulation with conflict resolution, prioritisation and control of firing sequences for timed S/T nets.

Model: The basic model is realized using two nodes for each philosopher. The first node represents the thinking philosopher and the second the eating one. Between two neighbouring philosophers is also a node, indicating a free chopstick. The transition between thinking and eating can fire if the node [thinking] and the left and right [free chopstick]-nodes are marked. If the transition at the node [eating] is firing, the three nodes described before, will be marked again. Analysis shows the expected results, and the Simulation Mode gives the expected firing sequences.

Refinement of the model. The first step of the refinement was to add a new node *hungry*. Now if a philosopher is [*thinking*] he will change to the node [*hungry*], before he is able to eat.

The second step was to clean the chopsticks before they are available again. This has been resolved by adding two extra nodes between eating and the left and right chopstick.

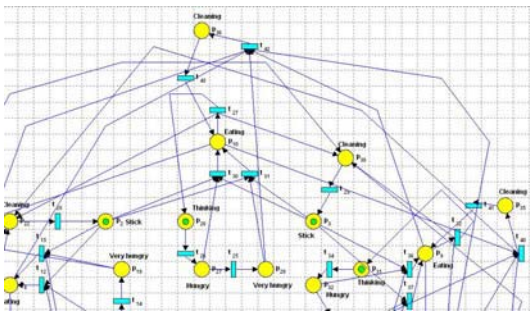

Figure 1: Refined model for Dining Philosophers

And the last task was to enable the philosophers communicate with their neighbours in the case he is very hungry (request token). Therefore, an extra node [*very hungry*] was introduced and a philosopher changes from [*hungry*] to this node if he is getting very hungry.

Than there are two options to start eating. The first is the same as at the node [*hungry*] and the second is contacting his neighbours if they are eating.

Every neighbour has the possibility to continue eating or to fire a transition to the very hungry philosopher and release the chopsticks in favour of him. The refined model is given in Figure 1.

Different strategies: In Figure 2 a screenshot of a conspiracy of two philosophers against the poor between them is shown. To simulate this situation a "synchronisation" node is introduced. A mark is added to the synchronisation node if one the conspirators start eating; is removed if one of the conspirators decides for thinking again. At the initialisation state the synchronisation node is marked and one conspirator is in state [*eating*]. The result is that the conspirators are eating alternately and the poor man in the middle never gets two chopsticks and has to starve.

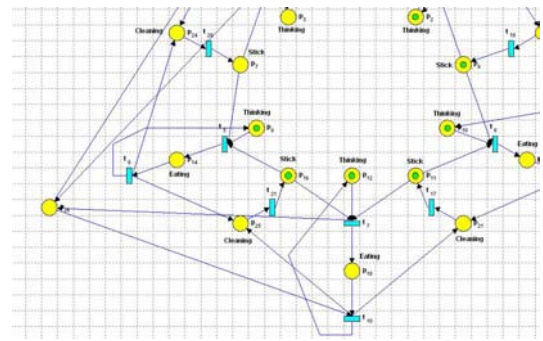

Figure 3: Conspiracy of two philosophers

Let's now consider a more fair approach: For this we assume a fairness pact is decided between all philosophers. To implement this, two synchronisation nodes are added to each philosopher. A philosopher could only start eating if these two nodes are marked. If a philosopher starts eating one node of each neighbour will be marked. This guarantees that all philosophers starts eating for equal times (Figure 3).

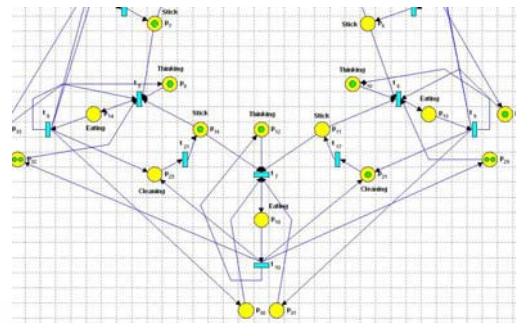

Figure 3: Fairness among all philosophers

C4 Classification: Petri Net Approach

Simulator: MATLAB Rel.14, PetriSim Toolbox

A System Dynamics Approach to ARGESIM Comparison C7 'Constrained Pendulum' with Vensim

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Simulator: Vensim is used for developing, analyzing, and packaging high quality dynamic feedback models. Models are constructed graphically or in a text editor. Vensim is based on the ideas of System Dynamics, so also qualitative modelling with causal diagrams is possible. Features include dynamic functions, subscripting (arrays), Monte Carlo sensitivity analysis, optimization, data handling, application interfaces.

Model description: The model is implemented using standard Vensim Blocks (Figure 1). Vensim PLE (free educational version) only supports Euler and RK4 integration algorithms. (RK4 is used in this solution; the professional Vensim version offers also better algorithms with stepsize control, etc.) Vensim does not support state event handling. Instead, the "IF THEN ELSE" command is used to change the length of the pendulum. To get good results, small timesteps have to be used. To avoid problems with discontinuous changes of integration variables, we use the variables instead of the angle velocity the tangential velocity, which does not change during the hit.

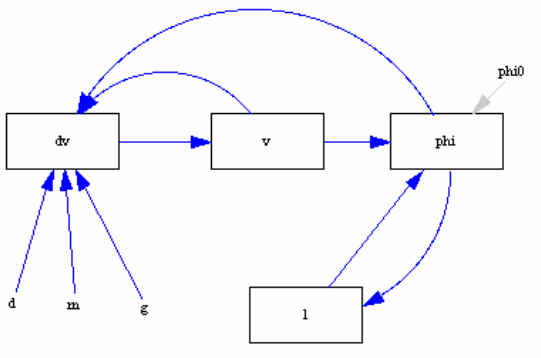

Figure 1: Vensim model in SD-like block notation

Task a: Simulation with different parameters. Vensim has some nice features that help experimenting with model parameters. It allows changing parameter values with a slider bar and automatically updates the graphs of all variables. Another nice feature is the temporarily change of parameters by means of `set up a simulation` menu. A standard feature is storing and reloading results from simulation runs, so that, results for task a can easily displayed within one graph (Figure 2).

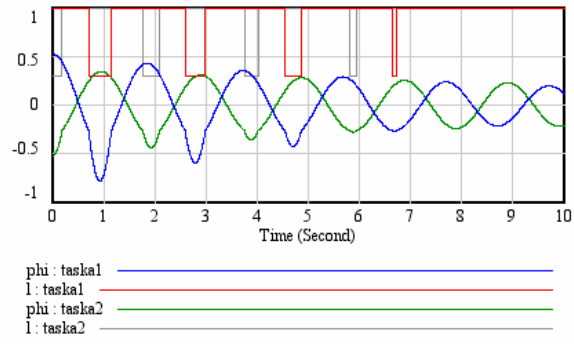

Figure 2: Angle, angle velocity and pendulum length for different parameters

Task b: Comparison of nonliear and linear model. However, it is not possible to apply any function to the data, e.g. it is not possible to calculate e.g. differences between stored data (in this case the deviation of angles of nonlinear and linear model. For this reason, the linearised and the nonlinear model had to be modelled together in order to compute the difference at model level (results in Figure 3).

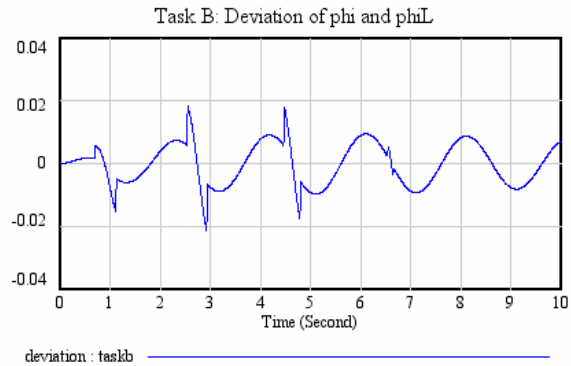

Figure 3: Difference of angles in linear and nonlinear model

Task c: Boundary value problem. The boundary value problem can be avoided by a time transformation. Reversing the time only changes the sign of the damping constant d. Therefore, the problem can be redefined as follows: The pendulum is released at position $-\pi/2$, with initial velocity zero. The damping constant is negative. The velocity of the pendulum when it is passing $\pi/6$ is to be calculated. In order to get this value, among the stored data for angle and angle velocity the values are interpolated around angle $\pi/6$. This results in a value of 2.18355 m/s.

C7 Classification: Approach without state events

Simulator: Vensim PLE 5.1

A Directly Programmed Solution to ARGESIM Comparison C 8 'Canal-and-Lock System' using Java

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Simulator: Java (version 1.4.2) is an object oriented programming language and was used here without any additional packages for simulation. So we had to do without the advantages of simulators (e. g. graphical modelling, libraries, experiment evaluations), but the complex logic could be formulated quite easy and simulation time is reduced to a few seconds.

Model. The system, which had to be simulated, is a canal and lock system through which barges can move in two directions, east and west. The special properties of the system lead to a quite complex logic: The canals, which lead to the lock, are narrow, so only one direction of movement is possible at a time. The lock needs a certain time to raise or lower its water level. When a barge arrives, it has to be raised or lowered respectively, and the lock can operate foresightedly if the barge is still on the way. Only one barge can be in the lock at a time.

Task a: Modelling assignment. Natural objects and therefore classes are barges and the lock itself. Another class, called lock system, contains vectors, which represent the places where barges sojourn during their journey and methods, which model time steps (and that advance the barges, that have to be moved from one vector to the next) and decide to which direction barges may go. A class called simulation adds barges to the system and calls the methods of lock system after every time step. As graphics were omitted, simulation results are printed to the console and written to a file, which can be read by Microsoft Excel (version 2000, later used for statistical computations).

Task b: Model validation with deterministic data. The logic of the model was simulated using the given data sets, and correct results, as given in the definition, were returned.

Task c: Variance reduction experiments. For task c, before the simulation started, a list with arrival times for the barges was generated, using the random generator provided by Java. This returns uniformly or normally distributed pseudo random numbers. With the inverse transform method exponentially distributed interarrival times were obtained. λ (the mean of Exp(x)) was set to 75. Although queues sometimes got long, they did not grow steadily until the end of the simulation. Without using variance reduction methods, the following results in three independent experiments were obtained for mean and 90% confidence intervals (CI):

	Mean	CI	σ^2
Run 1	531,0	± 39,8	242,2
Run 2	538,4	± 41,6	253,0
Run 3	524,3	± 42,0	255,1

Using the method of antithetic variates, the length of the 90% confidence interval could be significantly decreased:

	Mean	CI	σ^2	Reduction of Interval length
Run 1	526,1	± 25,2	108,2	36,8%
Run 2	526,0	± 27,9	119,8	33,0%
Run 3	524,7	± 26,6	114,5	36,5%

The number of barges that may pass the lock while barges heading to the other direction are waiting (called eastmax and westmax respectively) was in the experiments performed earlier each set to 5. Now should be investigated, how the system reacts if eastmax and westmax are raised to 6. Therefore a 90% confidence interval for the difference of the mean barge waiting time resulting from these two strategies should be formed. First, independent experiments were performed, giving the following results:

	Mean	CI	σ^2
Run 1	-77,6	± 64,9	279,1
Run 2	-85,4	± 68,8	295,6
Run 3	-110,8	± 69,5	298,9

The difference was computed by subtracting the mean of runs where (east-/west-)max was 6 from those where it was 5. So, the negative means show that setting eastmax and westmax to 6 resulted in a lower waiting time. The difference is even so high, that it is significant, and the probability of a type I error is less than 0,05. But, to be sure, also here a variance reduction method, the Common Random Number methodology, was used. The success was even better than in the first problem, as can be seen in the following table:

	Mean	CI	σ^2	Reduction of Interval length
Run 1	-62,0	± 7,6	32,6	88,3%
Run 2	-65,8	± 7,5	32,3	89,1%
Run 3	-64,1	± 7,0	30,3	89,9%

The interval lengths could be decreased considerably (the simulation effort had not to be raised).

C8 Classification: Directly Programmed

Simulator: Java 1.4.2

A Petri Net – based solution to ARGESIM Comparison C10 'Dining Philosophers II' using MATLAB and PetriSim

Thomas Löscher, Felix Breitenecker, Vienna Univ. of Technology; thomas@loescher.at

Simulator. This comparison solution was performed with a MATLAB toolbox "PetriSim", which is freely available. This toolbox offers a GUI for modelling classical and timed state / transition Petri nets and three operation modes: net analysis (P/T invariants, coverability tree, etc.) for S/T nets, simulation with conflict resolution strategies for S/T nets, and time simulation with conflict resolution, prioritisation and control of firing sequences for timed S/T nets.

Petri Net model. Five philosophers are sitting around a table. They are all going through the same cycles, starting with a thinking-phase, followed by a hungry state and then eating-phase (Figure 1). The problem is that every philosopher needs two chopsticks to eat, but between the philosophers it is only one available: each philosopher must share chopsticks with his neighbours, leading to simultaneous access to the same chopstick and occurrence of deadlock.

Task a: Single simulation run. Time for thinking and eating follows a discrete uniform distribution in the interval (1,10), whereby for modelling timed S/T nets were used. The toolbox allows gathering statistical data from a simulation, given in Table 1.

	thinking	eating	waiting		util.
P1	5,50+/- 2,87	5,44+/- 2,86	11,50+/- 8,08	C1	92,07%
P2	5,48+/- 2,86	5,51+/- 2,86	11,46+/- 8,04	C2	91,73%
P3	5,54+/- 2,87	5,51+/- 2,85	11,39+/- 8,08	C3	91,95%
P4	5,52+7- 2,87	5,44+/- 2,85	11,53+/- 7,95	C4	91,84%
P5	5,50+/- 2,90	5,56+/- 2,89	11,45+7- 8,04	C5	91,86%
all	5,50+/- 2,87	5,49+/- 2,86	11,47+/- 8,04	all	91,89%

Table 1: Results Average times (+/- standard deviation) of thinking, waiting and eating periods; rate of chopstick utilisation:

Figure 2: Priority wizard

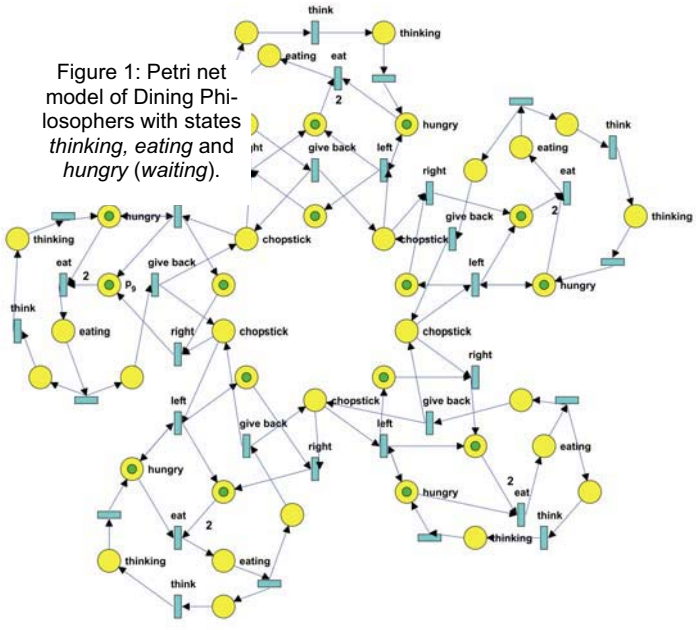

Figure 1: Petri net model of Dining Philosophers with states *thinking, eating* and *hungry* (*waiting*).

Task b: Simultaneous access. In a simultaneous access situation the philosopher sitting on the right gets the chopstick first and the philosopher to his left must wait. In the Petri net model this was realized with the prioritisation wizard (Figure 2). In case of a conflict the transitions which take the left chopsticks are higher prioritized than those which take the right chopsticks.

Task c: 50 Simulation runs – deadlock detection. Due to the Petri net basis the simulation ends if a deadlock occurs. Therefore the deadlock detection is the end of the simulation.

In the present version the PetriSim toolbox is relatively slow, so that 50 simulation runs until a deadlock do not seem practicable

C10 Classification: Petri Net Approach

Simulator: MATLAB Rel.14, PetriSim Toolbox

VHDL-AMS - based Hybrid Approach to ARGESIM Comparison 'C13 Crane and Embedded Control' with SystemVision

Leran Wang, Tom Kazmierski, University of Southampton, UK; {lw04r, tjk}@ecs.soton.ac.uk

Simulator. The VHDL-AMS model presented here implements the system model of a portal crane with embedded control as described in the Case Study by *Eduard Moser and Wolfgang Nebel, Proc. DATE'99, pp. 721-724*. This model incorporates both the continuous description of the crane dynamics and the embedded digital controller and the simulator used is SystemVision from Mentor Graphics. SystemVision is a state-of-the-art VHDL-AMS simulator which provides co-simulation capability for mixed signal designs as well as graphical design, waveform viewing etc.

Model. Figure 1 shows the system diagram of the model. The plant (i.e. car and load) is described by three differential algebraic equations (DAEs). In VHDL-AMS, DAEs are simply defined as simultaneous statements, no matter whether the equations are explicit or implicit. The sensor updates the car position and angle signals and sends them to the controller. The controller computes the values of drive voltage and brake signal according to the control signals from the crane operator and the monitoring signals from the sensor. The actuator is another DAE connecting the drive force and the drive voltage.

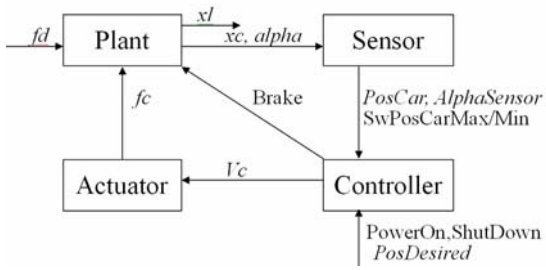

Figure 1: System diagram
(italics represent analogue quantities).

Task a: Comparison of uncontrolled nonlinear and linear model. The differences in the load position value x_l between the linear and nonlinear models proposed by the Case Study in Task a) are shown in the following table:

Disturbance(*Dest*)	-750	-800	-850
Δx_l (m)	0.2428	0.0453	-0.2336

Task b: Simulation of the controlled system. A VHDL-AMS testbench that describes the value and timing of each system stimulus (*f_d, PosDesired and PowerOn*) has been developed.

The linear crane model simulation results (Task b) are shown in Figure .2. The controller uses VHDL signals for event-driven objects, such as the Boolean signal '**Brake**' which stops the car immediately.

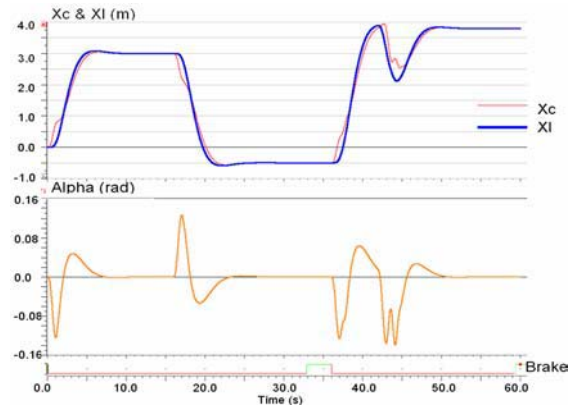

Figure 2: Simulation results for Task b.

The activation times of the brakes are: 32.88 sec and 59.36 sec. Unlike most previous published solutions, there is no brake applied around 13 sec, which means that in the SystemVision simulation the new desired position arrives before `abs(VC)<0.01 for 3 sec`.

Task c: Simulation of controlled system with sensor diagnosis. The diagnoses stipulated by Task c) are implemented by several processes in the controller architecture. Similarly to Task b), a suitable VHDL-AMS testbench was developed and simulation results are shown in Figure 3. The brakes are activated at 35.84 sec and 44.51 sec. The system enters the EmergencyMode at 18.09 sec and EmergencyStop is activated at 44.51 sec which is concurrent with the second brake.

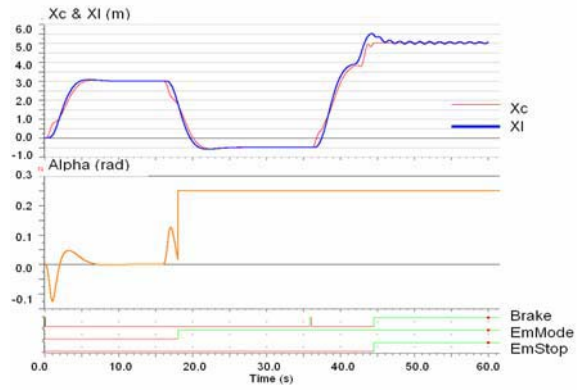

Figure 3: Simulation results for Task c.

C13 Classification: Hybrid Approach

Simulator: SystemVision Version 3.2

A Combined Approach to ARGESIM Comparison C15 'Clearance Identification' with Dymola and MATLAB

Andreas Ernst, Felix Breitenecker, Vienna Univ. of Technology, andreasernst@gmx.at

Simulator. Dymola is a simulation tool using Modelica as modelling language and which is suitable for modelling various kinds of objects. MATLAB is a widely used software tool based on numerical vector and matrix manipulation. Additionally it provides several toolboxes for various tasks.

Model. The model is implemented in Dymola. Each compartment is realised as a block (Figure 1) where the ODEs are directly programmed.

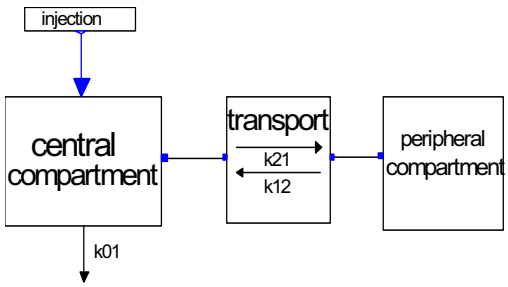

Figure 1: The Dymola model.

For the communication between the compartments we define an own Pin with the elements x and delta (= the amount of marker which is exchanged with the other compartment). The parameters k_{21} and k_{12} are only stored in the transport block which is responsible for the correct calculation of delta.

```
Central_connection.delta =
k12*peripheral_connection.x -
k21*central_connection.x
```

The injection is implemented with a simple if-else structure

```
OutPort1.signal[1]  =  if  time  <  tau
                    then D/tau else 0;
```

Task a: Simulation of the system. In Dymola the controlling of the parameters is very easy, but there are very few possibilities to layout the plots (for example naming the axes). Therefore the data were stored in MATLAB, and the MATLAB plot features were used. The results for different τ are given in Figure 2 and Table 1.

τ_1=0.5	τ_2=3	τ_3=240
x_1(1.5)=2336.2	x_2(4.5)=2188.5	x_3(240)=1060.9

Table 1: Values of x_1 one minute after injection.

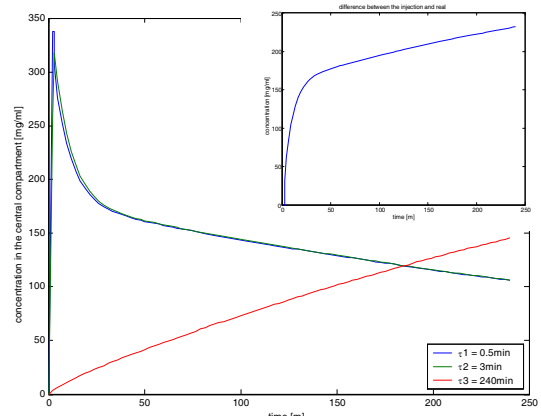

Figure 2: simulation results for different τ.

Task b: Identification of parameters. To accomplish the identification it is necessary to call the Dymola model from MATLAB. By translating a model with Dymola a `dymosim.exe` file is created in the directory where the corresponding `*.mo` is stored. First one has to add the directory \…\Dymola\Mfiles and all its subdirectories to the MATLAB path and set the current directory to the one where the `dymosim.exe` file is located. Then it is possible to call the model with experiment parameters `exp`, initial values `x0` and model parameters `p`:

```
[s,n]=dymosim(exp,x0,p)
```

The names of the signals are saved in `n` and the values in `s`. In this special case the arguments are:

```
exp=[0,240,0,500,1.e-4,1];
x0=[0.0;0.0];
p=[k01;k12;k21;V1;D;tau];
```

The identification is done with the Levenberg-Marquardt algorithm which is realised in the MATLAB command `lsqnonlin`. The results after the identification are k_{01}=0.0042, k_{12}=0.0584, k_{21}=0.0508 and V_1=7.270.

Task c: Error estimation. The data is disturbed in MATLAB and for each set of data the time intensive identification is started in MATLAB with calls to Dymola, giving the results in Table 2.

	k_{01}	k_{12}	k_{21}	V_1
mean	0.0042	0.0581	0.0503	7.2843
std. dev.	0.00027	0.0043	0.0028	0.061

Table 2: mean and std. dev of the identified parameters based on 100 samples.

C16 Classification: Combined Approach

Simulator: MATLAB Rel 14 SP1, Dymola 5.2

An Agent-based Approach to ARGESIM Comparison C16 'Restaurant Business Dynamics' with SeSAm

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Simulator: SeSAm (www.simsesam.de) is a Java™-based Multi-Agent Simulation Environment providing a generic environment for modelling and experimenting with agent-based simulation. It is focused on easy construction of complex models with the help of visual editors. Nevertheless SeSAm has the power of a programming language.

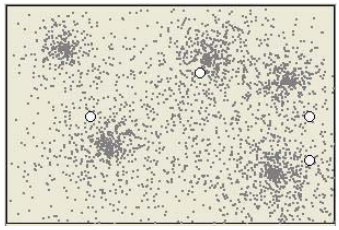


Figure 1: Runtime visualization of the model.

Model: The Model is implemented using an agent-based way with a timestepped schedule. Both restaurants and persons are agents. All of the agents' behaviour is defined by UML-like diagrams. Cells are defined as objects with a value *PeopleDensity* and a coordinate *CellUpperLeft* and are stored in a hashmap for fast access. All configurable parameters are part of a world, where agents "live" in. The world is some sort of main agent which has also a behaviour model. For each tick the world's actions are executed first, after that the order of agents is chosen randomly.

- *Space:* Everything takes place in a two-dimensional continuous map. At startup persons are randomly distributed according to the specifications. The people density of each cell is once calculated. The restaurant density is not stored but calculated every time a new restaurant is opened.
- *Time:* Each tick represents one day. After seven ticks all restaurants pay taxes to the government and open new restaurants or close down, according to financial situation and given probabilities.
- *Persons:* Every person keeps a list of restaurants in range. The list is updated every time the person wants to visit a restaurant. Persons try to go out for dinner even when their list is empty, because when it's time for dinner the list of restaurants in range is updated. Persons have a variable attribute *TimeBetweenDinner* which counts up to *NextTimeForDinner*, This variable is updated with a random number every time these two variables are equal.
- *Restaurants:* Each restaurant has a variable *Profit* accumulating the current week's profit. Another variable *TotalProfit* stores all accumulated profit.
- *Animation:* SeSAm provides a spatial map, where all agents can be observed visually. Since persons don't move, the only animation is the opening and closing of restaurants.
- *Experiments:* Experiment definitions allow simulating multiple scenarios varying start parameters.

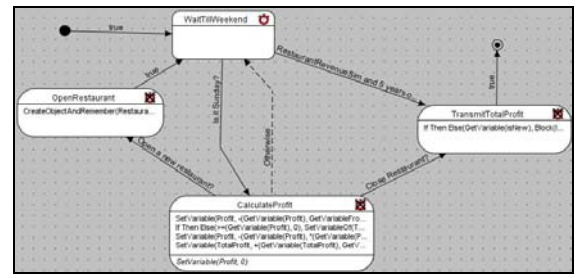


Figure 2 Visual modelling: restaurant's activity graph.

Task a: Time domain analysis. Evaluating the number of restaurants over 10 years, there is a mean of 5 restaurants, which is reached after about 100 days. From then there's no significant change in the average number of restaurants.

Task b: Tax income maximisation. Figure 3 shows the results of task b. The tax rate has been varied between 5% and 60%. Several simulation runs have been accomplished. The highest tax income is reached by a tax rate of 26%, indeed there's no real peak value, since the difference between the highest tax incomes is minimal. Very low and very high tax rates result in low tax income.

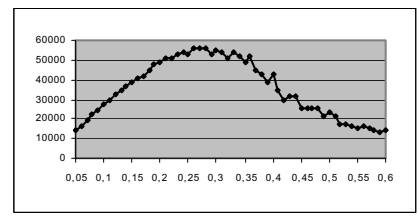


Figure 3: Tax income maximisation

Task c: Restaurants' revenue analysis. To find the best value for parameter *k*, the profit of new restaurants opened during the simulation has been summed up and divided by their number. Analysing the values it seems that a value of **0.5** is optimal. The worst value is 0, from 0.5 up to 6 the revenue slowly decreases.

A detailed description and model files can be found at www.simsesam.de/ArgesimC16

C16 Classification: Agent-based Approach

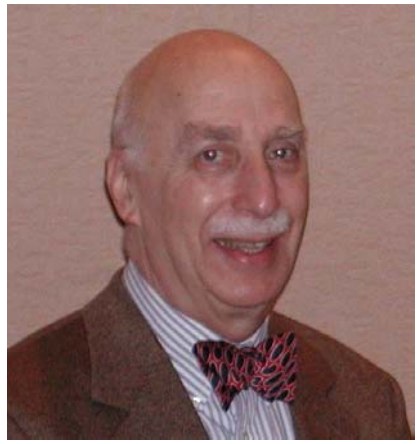
Simulator: SeSam v 1.9, 2004

SIMULATIONISTS - PERSONALITIES

This SNE corner – introduced in December 2000 in SNE 29 - follows three aims: to introduce young simulationists or simulationist of the rising generation, resp., to introduce simulationists serving in a simulation society, and to report about awards and personal events of well-known simulationists.

This issue reports about two famous simulationists, George Fishman from USA, and Eugene Kindler from Prague.

George S. Fishman Receives Lifetime Professional Achievement Award from the INFORMS Simulation Society



George S. Fishman

George S. Fishman, professor emeritus of operations research in The University of North Carolina at Chapel Hill, received the Lifetime Professional Achievement Award from the Simulation Society of the Institute for Operations Research and the Management Sciences (INFORMS).

The award was presented at the opening session of the 2004 Winter Simulation Conference, which was held in Washington, D.C., on December 6, 2004.

The highest honour of the INFORMS Simulation Society, this award is given at most annually to recognize major contributions to the field of simulation that are sustained over most of a professional career.

The 2004 award selection committee was chaired by Robert G. Sargent (Syracuse University), with members Thomas J. Schriber (University of Michigan) and Lee W. Schruben (University of California, Berkeley).

George Fishman is one of the pioneers in the field of discrete-event stochastic simulation, having inaugurated the use of rigorous approaches to the development of statistical methods for simulation during the 1960s; and he has continued to make major contributions to the field over five decades. He is the author of numerous journal articles and six books. He has made fundamental research contributions to several areas of simulation, many of which are seminal. These areas include output analysis; random-number and random-variate generation; efficiency improvement (variance reduction) techniques; and the simulation and analysis of stochastic networks.

His research work is both theoretical and practical, including the development of software for practitioners to use. His 1973 book, *Concepts and Methods in Discrete Event Digital Simulation*, is one of the first comprehensive books on all aspects of simulation. His 1996 book, *Monte Carlo: Concepts, Algorithms, and Applications*, received the 1996 Lanchester Prize from INFORMS as well as the 1997 Outstanding Simulation Publication Award from the INFORMS College on Simulation.

George has performed considerable service to the field of simulation, and for this he received the 1990 Distinguished Service Award from the INFORMS College on Simulation. He was President of TIMS College on Simulation and Gaming (now the INFORMS Simulation Society) from 1972 to 1974. George served as the first Editor of the Simulation Department of *Management Science* during the period 1978–1987. He served on the Board of Directors of the Winter Simulation Conference (1978–1980) and on the Editorial Advisory Board of the *ACM Transactions on Modeling and Simulation* (1989–1992).

Professor Fishman has been a leader in operations research education. He exerted remarkable leadership in advancing operations research at The University of North Carolina at Chapel Hill, including helping to establish the Department of Operations Research and serving as chair of that department for a decade. George also served as the advisor to numerous master's and doctoral students.

George S. Fishman is an exceptional contributor to the field of discrete-event simulation through his research contributions, dissemination of knowledge, leadership, and service. He is recognized as a distinguished world-class scholar and as a leader in the field.

Prof. Eugene Kindler - 70 year Anniversary

Eugene Kindler was born 22.5.1935 in Prague (Czechoslovak Republic). He studied mathematics at Charles University in the same town, where he got the grades of Doctor of philosophy in Logic and Doctor of sciences in Mathematics.

Czechoslovak academy of sciences appointed him Candidate of sciences in physics and mathematics.

Prof. Eugene Kindler

He worked eight years at the Research Institute of Mathematical Machines in Prague.

There he participated at the design of the first Czechoslovak electronic computers and then at their equipment by systems of automatic programming. He is the author of the first Czechoslovak ALGOL compiler.

Then he worked seven years at the Faculty of General Medicine of Charles University where he developed a computing center oriented to applications in nuclear medicine and radiobiology.

For its purposes he developed the first Czechoslovak simulation language called COSMO (Compartmental system modelling) and its compiler. Then he worked at the Faculty of Mathematics and Physics of Charles University.

Beginning with 1993, he collaborated with a newly established University in Ostrava (Czech Republic) in order to develop there a team for modern object-oriented simulation. After his retirement at Charles University, he transferred to the Ostrava University where he works as Professor of applied mathematics.

Having appreciated the first real stimuli coming in 1967 from simulation to the programming style that was later called object-oriented programming, Prof. Kindler has founded the application of the object-oriented methods in Czechoslovakia since the late sixties and nowadays his main interest concerns object-oriented simulation of systems that are controlled by simulating computers they contain.

During the seventies and eighties, he participated at projects concerning the optimizing of transport in agriculture and in machine production systems, of scheduling in steel production and in patient flows.

He was visiting professor at University of Pisa (Italy) and at West Virginia University in Morgantown (USA) and invited professor at Blaise Pascal University in Clermont-Ferrand and at University of South Brittany in Lorient (France). During the last decade, he participated at two projects supported by European Commission and oriented to modernizing maritime harbours.

6th EUROSIM Congress

Sept. 10-14, 2007, Ljubljana, Slovenia

www.eurosim2007.org

The Congress will be organised by the Slovenian Society for Modelling and Simulation SLOSIM with support of ASIM and other simulation societies. Detailed information about **EUROSIM'07**, is available at the web: www.eurosim2007.org

BOOK REVIEWS

Laws of Small Numbers: Extreme and Rare Events

Second, revised and extended edition
Michael Falk, Jürg Hüsler, Rolf-Dieter Reiss
Birkhäuser Verlag 2004; ISBN 3-7643-2416-3

As the scientific interest in rare events does not seem to be a rare event, this book has been greatly expanded since its first edition (published in 1994) to incorporate the new results on some 130 extra pages. The large number of new papers in this field is also reflected in the book's bibliography: It consists of an amazingly 382 items, 108 of which were published during the last ten years.

Consequently, the authors are able to present both theory and application of extremes and rare events quite thoroughly.

In the first part of the book, a theory of rare events (summarised under the title "functional laws of small numbers") is developed, and finally applied to different, specific subfields, e.g. in regression analysis.

Both univariate and multivariate extreme value theory is studied in detail. Especially in the latter case, recent results are discussed quite thoroughly. These include, among others, a new spectral decomposition of multivariate distributions in univariate ones, which comes in handy in this context.

The third, and final, part of the book deals with rare events of non iid observations, Also in this field, several new results have been incorporated into this new edition, which have turned up in various fields (e.g. risk analysis, telecommunication modelling) during the last decade.

While the emphasis of this book is clearly on the theory (using a profound mathematical approach), it also includes a lot of specific applications of rare events in various fields. It is open to anyone with a basic to intermediate knowledge in probability theory, as well as (partly) a basic knowledge in point and Gaussian processes, and provides a good, up-to-date introduction to the theory of extremes and rare events.

Beginner	Intermediate	Expert
	●	
Theory	**Mixed**	**Practice**
●		
Lecture Note	**Monograph**	**Proceedings**
●		

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Linear Systems Theory

A Structural Decomposition Approach

Ben M. Chen, Zongli Lin, Yacov Shamash, Birkhäuser Verlag 2004, ISBN 0-8176-3779-6

In this monograph, a structural decomposition approach is taken to study the properties of linear time-invariant systems with a given state space equation.

Worth mentioning is a MATLAB toolkit, which was developed by the authors and that contains m-functions for nearly all theorems formulated in the monograph. This toolkit can be downloaded freely for use in research and academic work. A whole chapter of the book is devoted to the description of the m-functions.

Although the first two chapters are used for an introduction to linear systems theory and mathematical background, the authors recommend it for advanced students which already have some background in linear systems and practitioners, working in areas related to systems and control theory.

In the book, all propositions are made for discrete and the equivalent continuous systems. There are extended examples, exercises and detailed proofs. The text is mixed up with some figures and block diagrams.

All in all, a quite exhaustive overview over linear systems theory is given using the new approach with structural decomposition.

Beginner	Intermediate	Expert
	●	
Theory	**Mixed**	**Practice**
	●	
Lecture Note	**Monograph**	**Proceedings**
	●	

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Methods of Applied Mathematics with a Matlab Overview

Jon H. Davis; Birkhäuser Boston, ISBN 0-8176-4331-1

This book provides an introduction to methods of applied mathematics, especially to the area of Fourier analysis. The topics treat classical mathematical physics, as well as problems arising in contemporary engineering mathematics contexts.

The structure of the examples is a mixture of analytical results und applications illustrating the results. The book includes model formulation and some technical discussion.

A closer look to the topics presents an introduction to the theory, applications of Fourier series and the convergence of such series. The applications include periodic solutions of ordinary differential equations and impedance methods for electric circuits. The third chapter considers elementary boundary value problems and the discussion of discrete boundary value problem analogue systems. The fourth chapter treats higher-dimensional, non-rectangular boundary value problems. The chapter takes a look on the Sturm-Liouville expansion, series solutions, the Bessel equations and inhomogeneous boundary value problems. An introduction to functions of complex variables occupies Chapter 5. The solutions are developed with Cauchy's integral formula and Residue Theorem. Applications are made to fluid flow. The sixth chapter includes Laplace transformation and continuous time Fourier transforms appear in Chapter 7. Applications of Fourier transforms are made to ordinary differential equations, integral equations, linear systems, communication problems, impedance analysis and partial differential equations. Discrete variable transforms are the subject of the eighth chapter. The chapter includes the discrete Fourier and z-transforms, as well as finite discrete Fourier transform together with the associated FFT.

The final chapter provides an introduction to some transform methods of a more specialized nature than those considered above. The topics include two-sided and Walsh transforms, integral transforms associated with the Sturm-Liouville problems of chapter 4, and the more recently developed topics in local waveform analysis. These include short-time Fourier transforms, und orthogonal wavelet expansions.

Beginner	Intermediate	Expert
	●	
Theory	**Mixed**	**Practice**
		●
Lecture Note	**Monograph**	**Proceedings**
●		

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Markov Chains and Invariant Problems

Progress in Mathematics

OnéHernández-Lerma, Jean Bernard Lasserre, Birkhäuser Verlag 2003, ISBN 3-7643-7000-9

This book is about discrete-time, time-homogenous Markov chains and their ergodic behaviour.

Chapter 1 concerns the mathematical background. This is mainly measure theory, topology, and some results from real analysis.

The rest of the book is divided in three parts. Part I gives a general introduction to Markov chains (MCs) and ergodic theory. Countable MCs, Harris MCs, MCs in metric spaces and a classification of MCs are the main topics.

Part II concerns MCs with some particular properties in contrast to the general MCs in Part I, for instance Feller MCs. The existence of solutions to the probabilistic Poisson equation is discussed and the notion of strong, weak and uniform ergodicity of MCs is introduced.

In Part III, questions concerning the existence and approximation of invariant probability measures are studied.

The publisher recommends the book for graduate students and researchers in theoretical and applied probability, operations research, engineering and economics. Applications and examples are kept very short indeed. This is rather a theoretical book, using the usual notation of measure theory. Nevertheless it is not too difficult to read, as for example every chapter is started with an elaborate introduction.

The authors don't insist on proofing every theorem used in the book, but from time to time refer to further literature. The book is divided in many balanced chapters and subchapters, which makes it easier to read only parts of the book.

Beginner	Intermediate	Expert
	●	
Theory	**Mixed**	**Practice**
●		
Lecture Note	**Monograph**	**Proceedings**
	●	

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Free Boundary Problems

Intern.Series of Numerical Mathematics, Vol. 147

Pierluigi Colli, Claudio Verdi, Augusto Visintin
Birkhäuser Verlag 2004; ISBN 3-7643-2193-8

This volume contains the contributions of participants of the conference on free boundary problems which was held in Trento (Italy) in June 2002.

In applications often occur differential equations that are defined in a domain which boundary is not known a priori. These problems are accordingly named "free boundary". Further conditions are used to eliminate indeterminacy. Examples for free boundaries are fronts between saturated and unsaturated regions in filtration trough porous media or between plastic and elastic phases in continuous mechanics. Other examples occur in reaction diffusion, fluid dynamics, biomathematics, … Free boundary problems often come along with discontinuities in the constitutive equations and this leads to a lot of mathematically interesting questions like existence and uniqueness of solutions, numerical approximations procedures and regularity properties.

Some of these problems are relevant for industrial applications and give the opportunity for cooperation between mathematicians and researchers from other fields.

The book consists of 26 papers which are dealing with free boundary problems in polymer sciences and biomathematics, image processing, transitions in anisotropic materials, modelling crystal growth, grain boundary motion and numerical aspects of free boundary problems.

Beginner	Intermediate	Expert
		●
Theory	**Mixed**	**Practice**
●		
Lecture Note	**Monograph**	**Proceedings**
		●

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Fourier Analysis and Convexity

Luca Brandolini, Leonardo Colzani, Alex Iosevich, Giancarlo Travaglini

Birkhäuser Boston, ISBN 0-8176-3263-8

After the prove of the isoperimetric inequality using Fourier series, the Fourier analysis quickly change to a serious approach in geometry, analysis, and number theory.

The first chapter describes Lattice Point Problems. The chapter involves a lot of number theory. A key tool is Fourier analysis and an unexpected high part of probability theory. At the beginning the theory is applied to special shaped areas. Later it is switched to arbitrary convex regions. The last investigation of the first chapter extends the periodic set of lattice points to a more general point distribution.

The second chapter treat with the integral operator in context with numerous problems in geometry. It's necessary to get statements about distance between geometrical objects like points and lines. Deep results in integral geometry and convexity can be obtained with the aid of harmonic analysis.

The third chapter looks on Fourier techniques in the theory of irregularities of point distribution. Such techniques include classical Fourier series and transforms as well as Fourier-Walsh analysis and wavelet analysis. It is shown that Fourier analysis can often be combined with ideas of number theory, geometry, probability theory and group theory. A short chapter is dedicated to spectral structure of sets of integers. Chapter 5 shows various examples that illustrate the fact that Fourier series and spherical harmonics are sometimes essential tools for providing interesting theorems in the geometry of convex sets. The sixth chapter contains Fourier analytical Methods in the study of projections and sections of convex bodies. Chapter 7 shows methods of tiling areas with aid of Fourier analysis. In the eighth chapter discrete maximal function and ergodic theorems are related to polynomials. There are described a series of results on the boundary of harmonic analysis, ergodic and analytic number theory. The central objects of study are maximal averages taken over integer points of varieties defined by integral polynomials. The book provides a survey on recent developments on the restriction problem in harmonic analysis, with an emphasis on the development of the past decade. The last chapter's aim is to describe some recent results and applications of the spherical Lp average decay of the Fourier transform of measures or characteristic functions of convex bodies.

Beginner	Intermediate	Expert
	●	
Theory	**Mixed**	**Practice**
	●	
Lecture Note	**Monograph**	**Proceedings**
	●	

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Handbook of Computational and Numerical Methods in Finance

Svetlozar T. Rachev, Birkhäuser Boston 2004, ISBN 0-8176-3219-0

The book presents results of current research focusing on various numerical methods in finance. This leads to a discipline at the intersection of probability theory, finance and numerical analysis. It is partitioned into 12 independent papers:

1. is an introduction to skewness and kurtosis trades and state price density estimation techniques.
2. builds credit risk models.
3. focuses the modelling of energy prices, which are handled by GARCH type models based on the Pareto stable distribution.
4. leads to the integration of Malliavin Calculus in the Monte Carlo calculation of financial sensitivity quantities (Greeks).
5. explores the applicability of residual bootstrap to testing the unit root hypothesis when the model errors are heavy tailed with infinite variance.
6. introduces and tests several static and dynamic portfolio choice models and value at risk models.
7. presents quantization methods.
8. reviews common numerical and statistical methods for stable modelling.
9. introduces the core methodology of classic and modern heuristics.
10. compares portfolio optimization approaches with expected regret and conditional value at risk utility functions.
11. describes the main idea of rating based credit risk models and several numerical methods that can be applied to estimate continuous time transition matrices or adjusting transition probabilities.
12. presents some results on numerical analysis of stochastic differential systems.

Most papers are focused on financial approaches.

Beginner	Intermediate	Expert
		●
Theory	**Mixed**	**Practice**
	●	
Lecture Note	**Monograph**	**Proceedings**
		●

Markus Wawra

Parabolic Quasilinear Equations Minimizing Linear Growth Functionals

Ferran Sunyer i Balaguer Award winning monograph

Fuensanta Andreu-Vaillo, Vicent Caselles, José M. Mazon, Birkhäuser Verlag 2004; ISBN 3-7643-6619-2

This award-winning book deals with general existence and uniqueness results for (certain kinds of) quasilinear parabolic equations. Especially, the authors focus on the case of minimizing total variation flow, as this kind of problem is of particular interest in several different fields such as continuum mechanics and image processing.

Right the first chapter of the book deals with a problem in the latter field: The process of image restoration is studied quite thoroughly, for which the image acquisition model is used.

After that, the authors address themselves to the task of minimizing total variation flow in full detail. The problem of existence and uniqueness of solutions of the Neumann, the Cauchy as well as the Dirichlet problem is discussed. Moreover, some results on asymptotic behaviour and qualitative properties of the solutions are proved. Particularly, some explicit solutions of the image denoising model are computed.

Finally, similar techniques are used for studying quasilinear parabolic equations whose operator is, in divergence form, the subdifferential of a Lagrangian, which is convex and has linear growth in the magnitude of the gradient. The results can be used for mathematical models in different fields such as image processing and faceted crystal growth.

To sum up, this book covers the problem of minimizing total variation flow and the question of existence and uniqueness of solutions of certain quasilinear parabolic equations in full detail. While the book is open to graduate students and researchers alike, certain knowledge of total variation flow is quite helpful in order to fully appreciate the book.

Beginner	Intermediate	Expert
		●
Theory	**Mixed**	**Practice**
●		
Lecture Note	**Monograph**	**Proceedings**
	●	

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Multivariate Polynomial Approximation

Manfred Reimer, Birkhäuser Verlag,
Basel – Boston – Berlin 2003,
ISBN 3-7643-1638-1; ISNM Vol 144

The first 4 chapters are reserved for the introduction into several definitions, principles and facts of several topics like reproducing kernels, rotationinvariant spaces, T-kernels, Gegenbauer polynomials, homogeneous polynomials and biorthonormal systems.

In the 5th chapter the author defines what a best approximation has to be and starts searching for it, first in inner product spaces which leads to orthogonal projections.

Further attention is paid to interpolatory projections, which plays an important role in numerical analysis, extremal basis and quadrature.

In the chapters 6 and 7 approximation-techniques like in the 5th chapter or generalized hyperinterpolation are discussed for the sphere and ball.

The topic of the last section is recovery problems for real functions as they appear for example in computer tomography or magnetic-resonance tomography. To gain approximation up to the best possible order the Radon transform needs to be introduced. Finally the book ends with short view on k-plane transform.

The whole theory is treated under a constructive view.

The book is written in a strict definition – theorem – proof scheme which guarantees a good overview. But it is not always clear what for the actual theory will be used later on.

A bit more information in the beginning of each chapter about the target of the sections and the way to go there would make it easier.

Beginner	Intermediate	Expert
		●
Theory	**Mixed**	**Practice**
●		
Lecture Note	**Monograph**	**Proceedings**
	●	

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Geometric Modeling

Dagstuhl 2002 Conference

S. Hahmann, G. Brunnett, G. Farin, R. Goldman
Springer-Verlag Wien New York 2004
ISBN 3-211-20818-6

This book implies selected articles of lectures that were given at the seminar on Geometric Modelling in Dagstuhl in May 2002. The lecturers came from all over the globe including the leading experts on this subject.

The topics discussed at this meeting were the following: curve and surface modelling, non-manifold modelling in CAD, multiresolution analysis of complex geometric models, surface reconstruction, variational design, computational geometry of curves and surfaces, 3D meshing, geometric modelling for scientific visualization, geometric models for biomedical application.

Nowadays Geometric Modelling is not only used for curve and surface design for CAD and CAM systems. It is needed in very different branches of science for simulation, medical imaging, scientific visualisation or virtual reality. In the main a topic that is getting more and more important.

The selection of the papers presented at this seminar is well done. Excellent articles to broadly based topics.

Each special, detailed but self-contained what makes it a delight to read through this book or only some of its lectures.

In summary, this book gives a good compendium of the workshop on Geometric Modelling held at Schloss Dagstuhl.

Beginner	Intermediate	Expert
	●	
Theory	**Mixed**	**Practice**
●		
Lecture Note	**Monograph**	**Proceedings**
		●

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Analytic Methods in Anisotropic Elasticity

With Symbolic Computation Tools.

Rand, Rovenski, Birkhäuser (2005)
ISBN 0-8176-4272-2

This book or a very similar one was bound to be published these days. And we should be glad that the time has come.

Computer Algebra Systems (CAS) became more and more powerful in recent years, but still, as the author puts it, analytical solutions are treated as art while numerical algorithms are use to do the 'real work', especially because they work quite independent from factors like geometry which lead to a high complexity in the analytical solution.

But expert knowledge in the use of a CAS enables a programmer to compute a very general analytic solution of a given problem. This solution can be incorporated in a higher programming language, and the solution of a particular problem is reduced to inserting the correct parameters in a simple formula, with a neglect able computation time.

The authors use this approach to solve various problems for anisotropic elasticity, using the CAS Maple.

After a fulsome introduction into elasticity, the analytical methodology used and the mathematical representation of anisotropic materials, various cases like solid coupled monoclinic beams or uncoupled beams under tip loads are discussed.

This book also includes a CD-ROM, where most of the maple data used for this book is included. Although the solutions provided in this are nowhere near a so to say “solver”, it is nevertheless a big step forward.

Beginner	Intermediate	Expert
		●
Theory	**Mixed**	**Practice**
●		
Lecture Note	**Monograph**	**Proceedings**
	●	

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SNE EDITORIAL BOARD

www.argesim.org

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If you have any information, suggestions for contributions (technical notes, developments, comparison solutions), questions etc. please contact a member of the editorial board or the editor-in-chief.

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EUROSIM SOCIETIES

EUROSIM
Federation of European Simulation Societies

www.eurosim.info

General Information

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. 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 (UK, Ireland)
- **AES** – Asociación Española de Simulación (Spain; observer member)
- **PSCS** – Polish Society for Computer Simulation (Poland, observer member)
- **ROMSIM** - Romanian Society for Modelling and Simulation (Romania; observer member)

EUROSIM Board

EUROSIM is governed by a board consisting of one representative of each member society, president and past president. The President is proposed by the society organizing the next EUROSIM Congress. Secretary and Treasurer are elected between the members of the Board. Representatives for the official EUROSIM publications (journals SIMPRA and SNE) are also invited to the EUROSIM Board Meetings.

At the **EUROSIM'04** Congress the EUROSIM Board appointed new officers for a three years period: B. Zupančič (president), P. Fritzson (secretary), F. Breitenecker (treasurer+SNE), Y. Hamam (past president), J. Halin (SIMPRA), F. Maceri (Savastano award).

EUROSIM Official Publications: SIMPRA and SNE

SNE

EUROSIM societies are offered to distribute to their members the journal **Simulation News Europe** (**SNE**) as official membership newsletter. SNE is a membership newsletter (with information from the societies) as well as a "technical" journal with reviewed contributions. (Technical Notes, ARGESIM Comparisons, Short Notes etc.).

SNE's *Notes Section* publishes technical notes (fully reviewed), short notes (reviewed), and software notes on general overviews or new developments, on new software and hardware, on new applications and methods, and book reviews on recent books in modelling and simulation and in related areas. Furthermore **SNE** presents *Simulation Centres,* introduces *Simulationists* and reviews recent books on modelling and simulation and related topics.

SNE's special series *Comparison of Modelling and Simulation Technique and Tools* (**ARGESIM Comparisons**) gives a comprehensive overview on developments in application and implementation.

SNE reports in the *News Section* about EUROSIM, EUROSIM societies, SCS Europe and about other International Simulation Societies and Simulation Groups. Furthermore, basic information on EUROSIM societies is "mirrored" at the new designed EUROSIM website. More information at www.argesim.org

SIMPRA

Members of EUROSIM societies can subscribe the official EUROSIM scientific journal **Simulation Modelling Practice and Theory** (**SIMPRA**) at a significantly reduced price. Information about recent issues and special issues may be found in this SNE issue elsewhere. More information is available at WWW: ees.elsevier.com/simpat/

Savastano award

Prof. Savastano was the first EUROSIM president. He died suddenly in February 1990. After his death the EUROSIM Board decided to install The Savastano Award, to be granted every three years during EUROSIM Congress.

Conferences - EUROSIM Congress

EUROSIM societies organise national and international conferences and workshops, with the common trademark *EUROSIM Conference.* For details please refer to the announcements of the societies.

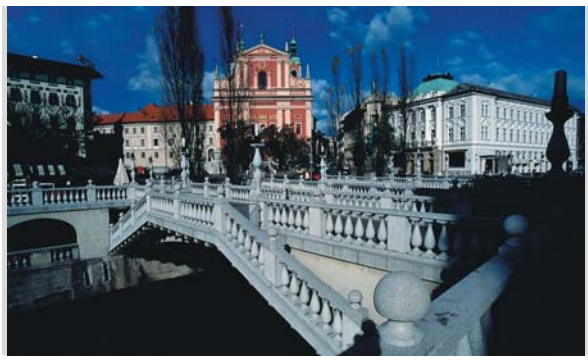
The EUROSIM Congress is arranged every three years by a member society of EUROSIM. **EUROSIM'04**, the 5th EUROSIM congress, took place in Noisy-le-Grand, near Paris, France in Sept. 2004.

EUROSIM'07

6th EUROSIM Congress

Sept. 10-14, 2007, Ljubljana, Slovenia

www.eurosim2007.org



The next congress, **EUROSIM'07**, the 6th EUROSIM Congress, will take place in September 2004 in Ljubljana, Slovenia.

The Congress will be organised by the Slovenian Society for Modelling and Simulation SLOSIM with support of ASIM and other simulation societies.

Detailed information about **EUROSIM'07**, is available at the web: www.eurosim2007.org

For personal information about EUROSIM and about the congress EUROSIM 2007, please contact the EUROSIM president, Mr. B. Zupančič.

EUROSIM contact

Information about EUROSIM and EUROSIM societies may be found at EUROSIM's WWW Server: www.eurosim.info. Personal information can be obtained also from the EUROSIM officers.

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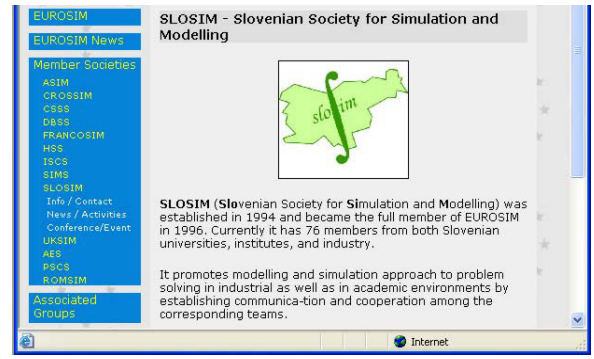
New EUROSIM Webpage

In 2004, the EUROSIM board decided to set up a new webpage. The new webpage is based on a content management system and will serve

- as info server for people interested in EUROSIM,
- as info server for members of EUROSIM societies,
- and as administration server for officers of EUROSIM and for officers of EUROSIM societies.

Each EUROSIM member society can add itself contents to their pages. Using the password already provided to the societies, any information can be put into the system. It is suggested to make use of the predefined structure with Info/Contact, News/Activities, and Conferences/Events.



The webpage offers also download access to SNE archive and other publications. In October, each society will also get a login for its personal members (being valid one year, coupled with SNE subscription).

Other highlights of the server are a news plugin - also for member societies and associated societies, a calendar of event (with online conference announcement; in preparation), a link page, and an area for EUROSIM administration.

We hope to finish work with the new server end of 2005, releasing all planned features.

ASIM - Buchreihen / ASIM Book Series

ASIM - Buchreihen / ASIM Book Series

Reihe Fortschritte in der Simulationstechnik / Series Frontiers in Simulation – with SCS

kürzlich erschienen / recently appeared:

- R. Hohmann (Hrsg.): Proc. 17. Symp. Simulationstechnik, Magdeburg, 2003
- Dj. Tavangarian (Hrsg): Proc. 16. Symp. Simulationstechnik, Rostock, 2002
- W. Borutzki: Bondgraphen – Eine Methodologie zur Modellierung multidisziplinärer dynamischer Systeme;
- H: Szczerbicka, T. Uthmann (Hrsg.): Modellierung, Simulation und Künstliche Intelligenz
- S. Wenzel (Hrsg.): Referenzmodelle für die Simulation in Produktion und Logistik
- I. Bausch-Gall (Hrsg.): Simulation technischer Systeme – Stand und Entwicklungen

Schwerpunkte / Topics:

- Statusberichte über Simulation in den ASIM Fachgruppen / Status Reports
- Allgemeine Monographien / General Monographs
- Proceedings der ASIM Tagungen / Proceedings of Conferences

Reihe Fortschrittsberichte Simulation / Series Advances in Simulation – with ARGESIM / SCS

kürzlich erschienen / recently appeared:

- Th. Preiß: Relationale Datenbanksysteme als Basis für Modellbildung und Simulation von kontinuierlichen Prozessen
- E. Hajrizi: Intelligentes Online – Planungs- und Steuerungssystem für Flexible Produktionssysteme basierend auf Simulation und Optimierung mit genetischen Algorithmen
- Th. Fent: Applications of Learning Classifier Systems for Simulating Learning Organizations
- H. Ecker: Suppression of Self-excited Vibrations in Mechanical Systems by Parametric Stiffness Excitation
- K. Kleemayr: Modellierung von Schnee und Lawinen

Schwerpunkte / Topics:

- Spezielle Monographien (Dissertationen, ...) / Special Monographs (PhD-thesis, ...)
- Erweiterte Berichte der ASIM Fachgruppentreffen / Workshop Proceedings
- Handbücher für Simulationssprachen, Berichtband / User Guides, Reports

Preis / Price: EUR 20.- (ASIM-Mitglieder EUR 15.-) + Versandkosten

Bestellung, Information, Informationen für Autoren / Info, Orders:

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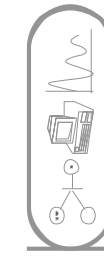
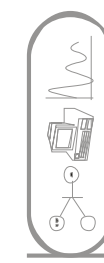
Fax: +49-89-3231063, or online: info@asim-gi.org, www.asim-gi.org

ARGESIM REPORT



ARGESIM REPORT



ASIM German Simulation Society

Arbeitsgemeinschaft Simulation

www.asim-gi.org

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

From the ASIM Board

At the last board meetings in Bonn (December 2004) and Erlangen (April 2005) an advanced versions of the new ASIM web page was presented, and the organisation of the ASIM conference ASIM05 in Erlangen was discussed. Some changes with respect to an advanced offer for members at the new server were decided. It is planned, to finish works on the new server end of 2005. In Switzerland, now Werner Maurer from Zürcher Hochschule Winterthur will take care on ASIM members. The board thanked Dr. Veronika Hrdlickza, who has retired, for her work in Switzerland.

ASIM Publications

ASIM is publishing (co-publishing) **ASIM-Nachrichten** and **SNE** (Simulation News Europe). Both journals are regularly published and sent to all ASIM members (as part of their membership 700 issues) and spread for promotion (500 issues). Furthermore, the ASIM working groups report in so-called **ASIM - Mitteilungen** about their meetings, about special developments, etc - either as ASIM self-publication or as publication is series of other publishers (e.g. **ARGESIM Reports**).

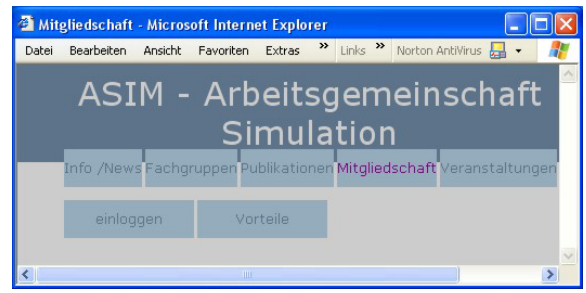
ASIM co-operates with SCS Europe and with **ARGESIM** (TU Vienna) in publication of two book series „Fortschritte in der Simulationstechnik – Frontiers in Simulation“ and ASIM / ARGESIM / SCS book series „Fortschrittsberichte Simulation – Advances in Simulation“. In these series the Proceedings of the annual ASIM conferences, status reports of the working groups, and PhD theses are published. As the “SCS European Publishing House” had to stop operating because of financial problems in the SCS European office, ASIM will continue the co-operation with the legal successor “European Publishing House”, founded as “Verein” by Rainer Rimane.

Change of publication structure. Based on the results of a questionnaire, board discussed and decided some changes for the publications:

- **ASIM-Nachrichten** will appear as electronically newsletter.
- **SNE** should be extended. News and general information will be put as (German or English) addendum in SNE’s news section.
- ASIM will publish **Special Issues SNE**. Each year one ASIM working Group will prepare a special issue dealing with “Status, Developments and Trends” in its area.
- **ASIM-Mitteilungen** of the ASIM Working Groups will be also published electronically; all ASIM members will have access via the ASIM server
- The **ASIM web pages** will be redesigned totally, offering special areas for members, interactive information, mailing lists, download of workshop proceedings, etc, based on a content management system.

New ASIM Webpage

At present the new ASIM webpage is tested. The webpage is driven by content management system (TYPO3). The member data base is included into the web, with interactive change for members and query and newsletter distribution for the Working Groups. The members’ area will offer Proceedings of ASIM Workshops, SNE archive, material for education, etc.



ASIM Working Groups

Working Group Structure. The reorganisation of the Working Groups is now finished. The new structure was approved by the GI board in December 04.

The ASIM Working Group **“Methods of Modeling and Simulation“** met on March, 9 - 11, 2005 at University Wuppertal. The workshop offered a review of various modelling techniques and modelling approaches, in order to get better insight into developments and trends in more or less distinct simulation areas.

Overview lectures of modelling and simulation specialists introduced into trends and developments:

Prof. Dr. M. Arnold (Universität Halle-Wittenberg)
"Dynamische Simulation im virtuellen Fahrzeugentwurf"

Prof. M. Behr, Ph.D. (RWTH Aachen)
"Challanges in computational modeling and design of blood pumps"
Priv.-Doz. Dr.-Ing. M. Bücker (RWTH Aachen)
"Graphenpartitionierung: Algorithmen und Anwendungen"
Prof. Dr. H.-J. Bungartz (Universität Stuttgart)
"Makro, mikro, nano - was tun mit Strömungen?"
Prof. Dr. A. Kolb (Universität Siegen)
"Simulation based upon Programmable Graphics Hardware"
Prof. Dr. B. Lang (Bergische Universität Wuppertal)
"Guaranteed Results with Interval Computations - Why and How?"
Doz. Dr. Dr. Th. Lippert (Forschungszentrum Jülich)
"Grid Computing"
Dipl.-Ing. R. Reichardt (Universität Siegen)
"Ereignisdiskrete Simulation von Vielteilchensystemen"
Dipl.-Ing. M. Remelhe (Universität Dortmund)
"Modellierung und Simulation technischer Systeme mit ereignisdiskreter und kontinuierlicher Dynamik"
Prof. Dr. U. Rüde (Universität Erlangen-Nürnberg)
"Simulation von Schäumen mit Parallelrechnern"

Additionally, a poster session offered opportunity for diploma or PhD students to present their works. Most overview lectures and poster abstracts will be available at the ASIM server (October 2005) as **ASIM-Mitteilung**.

For March 2006, the next workshop of the working group is planned, date and place to be announced.

The ASIM working group **"Simulation in Environmental Systems and Medicine, Biology and Biophysics"** co-operates since many years with other working groups of GI in the area of environmental simulation. The working group is running two annual workshop series, the one *Simulation in Environmental Systems*, and the other one *Modelling and Simulation of Ecosystems*.

The last **Annual Workshop Simulation in Environmental Systems** took place in Dresden, March 16 – 18, Dresden.

Vom 16. bis zum 18.03.2005 trafen sich gut 60 Wissenschaftler aus Deutschland, Österreich, der Schweiz, Polen und China im Leibniz-Institut für ökologische Raumentwicklung e. V. (IÖR). Der Workshop hatte zum Ziel den aktuellen Stand der Umweltmodellierung im deutschsprachigen Raum ASIM vorzustellen und interdisziplinär Lösungen und Ideen zur Umweltmodellierungen zu diskutieren.

Die ersten sechs Beiträge befassen sich mit der Entwicklung von Kenngrößen und Zielkriterien sowie mit der Ableitung von Mustern zur Analyse, Optimierung und Simulation von Landschaften auf der Basis von GIS- und Laserscanner-Daten. Es folgen drei Vorträge über Klassifikation, Analyse und Simulation von Gebäudebeständen in Städten. Der größte Teil mit acht Beiträgen behandelte Probleme des Flussgebietsmanagements und der Wasserbewirtschaftung sowie Modellierung von Nährstoffeinträgen in Flussgebieten.

Sechs Beiträge fokussieren auf die Ausgestaltung und Standardisierung von Schnittstellen sowie die Anwendung von Informatikwerkzeugen, z. B. Web, zur Umweltmodellierung. Den Abschluss bilden fünf methodisch ausgerichtete Beiträge, die Methoden und Konzepte wie Fuzzy-Methoden, BitTrees und Datenfilter-Techniken auf ihre Anwendbarkeit und Nutzen in Umweltmodellen hin untersuchen.

Eine Posterpräsentation ergänzte die Vorträge. Auch diesmal war der Workshop durch interessante und spannende Vorträge sowie anregende Diskussionen in freundlicher und angenehm entspannter Atmosphäre geprägt. Bei zwei Abendveranstaltungen nutzten viele Teilnehmer und Mitglieder der Fachgruppe die Zeit, alte Bekanntschaften aufzufrischen, neue zu knüpfen und sich gegenseitig über aktuelle fachliche Entwicklungen zu informieren. Ein schönes Erlebnis war die Führung durch den historischen Stadtkern von Dresden am Abend des 17. März.

For 2006, the next workshop in these series is prepared for Leipzig (info: www.ioer.de/SUG/):

ASIM SUGMBB Workshop 2006
Simulation in Environmental Systems
March 22 – 23, 2006; Leipzig

For October 2005, the next workshop in the series *Modelling and Simulation of Ecosystems* is scheduled:

9. Workshop
Modelling and Simulation of Ecosystems
October 26 – 28, 2005; Kölpinsee / Usedom

The workshop will inform about status and trends in modelling and simulation of ecosystems and will seal with the following topics:

- Modelling concepts in ecology
- Models for aquatic and terrestrial ecosystems
- Software tools for management of environmental systems
- Discrete and continuous simulation of ecological systems
- Coupling of simulation models, GIS applications, etc.

Detailed information can be found at the web: www.tu-cottbus.de/umweltinformatik/1veranstaltungen.html

The contributions to both workshop series are published in the book series Umweltinformatik at Shaker Verlag, Aachen. It is planned to make also these Proceedings electronically available. The newest book in these series is:

- Jochen Wittmann, Nguyen Xuan Thinh (Hrsg.)
  Simulation in Umwelt- und Geowissenschaften
  Workshop Dresden 2005
  Shaker Verlag, Aachen, 2005; ISBN 3-8322-4051-9

The working group **„Simulation of Technical Systems"** met 2005 in Berlin, for a workshop "Simulation of Technical Systems", on March 1 – 2, 2005. The workshop concentrated on *Simulation Methods and Test Methods for Software in Automotive Systems* and dealt with simulation and test of software systems in automotive from design to implementation, emphasising on:

- Clarity of the design process
- Model-based development
- Language standards (VHDL-AMS, Modelica)
- Simulation in electronics
- Model test
- Validation (experiment vs. simulation)

Plenary lectures gave an interesting overview, also from industry viewpoint:

Anforderungen an das Software-Engineering aus der Sicht der Automobilindustrie
Dr. Klaus Grimm, DaimlerChrysler AG

Modellierung und Simulation gemischt kontinuierlich-diskreter technischer Systeme
Dr. Christoph Nytsch-Geusen, TU Berlin / Fraunhofer FIRST)

All contributions of the workshop are available as printed ASIM-Mitteilung and can also be downloaded from the ASIM server (for ASIM members).

For 2006, the working group is preparing a workshop in Munich:

ASIM STS Workshop 2006
Fachhochschule Munich
February 20 – 21. 2006

Preliminary information can be obtained from Dr: Ingrid Bausch-Gall, Ingrid.Bausch-Gall@Bausch-Gall.de. A website is in preparation.

The working group **Simulation in Production and Logistics** (SPL) organised in October 2004 the very successful bi-annual conference 11th Conference ***Simulation in Production and Logistics***. These conference series will be continued with the (first call to be distributed in September 2005):

12th Conference
Simulation in Production and Logistics
September 26 – 27, 2006, Kassel

The working group also is organising one – day meetings, usually at industry. The last meetings were:

SPL Meeting April 6, 2005, Fraunhofer IPK, Berlin
Topics: Overview lectures from other Workings Groups, reports from task group *Quality Criteria* and task group *Validation*.

SPL Meeting June 17, 2005; Flensburger Schiffbaugesellschaft, Flensburg
Topics: Lecture on Modelling and Simulation at Flensburger Schiffbaugesellschaft, reports from task group *Quality Criteria* and task group *Validation*, organisation and election within the working group

The next meeting will take place in Ingolstadt (details will be sent via email):

ASIM SPL Meeting
Simulation in Automotive Industry
AUDI AG Ingolstadt, November 23, 2005

The Working Group **"Simulation of Traffic Systems"** had to cancel the workshop which was scheduled for March 4, 2005, in Magdeburg because of lack of response. At present discussions take place with respect to organisation of meetings.

ASIM Conferences

ASIM organises the annual ASIM Conference, the ASIM Working Groups organise annual workshops (up to 100 participants) and bi-annual conferences (more than 100 participants. ASIM cooperates in organising the three-annual EUROSIM Congress.

A special co-operation was established with the annual conference series SIMVIS – Simulation and Visualisation in Magdeburg (March) and with the three-annual conference series MATHOD - Mathematical Modelling in Vienna (February).

In 2004, no Annual ASIM Conference took place, because of the EUROSIM congress. The annual conference ASIM 2005 will take place in Erlangen – organised by R. Rimane (details below). The conference ASIM'06 is planed to be held in Hannover, and in 2007, SLOSIM, the Slovenian Simulation Society will organise the EUROSIM Congress; ASIM will not only co-sponsor, but also co-organise this event.

Announcement ASIM'05

ASIM 2005

18th Symposium Simulation Technique

Friedrich-Alexander University in Erlangen
Sept. 12 – 15, 2005; Erlangen, Germany
www10.informatik.uni-erlangen.de/asim2005

The goal of the 18th Symposium on Simulation Techniques is the exchange of information and experience between experts from industry, science, and education. It will provide a stimulating environment for the development of new ideas and for the identification of new applications and trends in the field

ASIM 2005 offers:

- Invited talks on new developments and trends
- Presentations and posters on all topics of modelling and simulation
- Workshops on current topics
- Exhibition of hardware and software for simulation
- Tutorials on new methods
- User group meetings on software tools

The Final Programme can already be found at the conference website.

Coming ASIM Conferences

ASIM 2005
18th Symposium Simulation Technique
Friedrich-Alexander University in Erlangen
Sept. 12 – 15, 2005; Erlangen, Germany
www10.informatik.uni-erlangen.de/asim2005

ASIM – SUGMBB Workshop
Modelling and Simulation of Ecosystems
October 26 – 28, 2006; Kölpinsee / Usedom
www.tu-cottbus.de/umweltinformatik

ASIM – SPL Meeting
Simulation in Automotive Industry
November 23, 2005; AUDI AG, Ingolstadt, Germany
www.asim-gi.org

MATHMOD 2006
5th Vienna Symposium on Mathematical Modelling
February 8 – 10, 2006, Vienna, Austria

ASIM – STS Workshop 2006
February 20 – 21, 2006; Munich, Germany
www.asim-gi.org

SIMVIS 2006
17th Conference "Simulation and Visualisation"
March 2 – 3, 2006; Magdeburg, Germany

ASIM – GMMS Workshop 2006
March 2006; time and place to be announced

ASIM – SUGMBB Workshop
Simulation in Environmental Systems
March 22 – 23, 2006; Leipzig, Germany
www.ioer.de/SUG/

ASIM 2006
19th Symposium Simulation Technique
September 11 – 14, 2006, Univ. Hannover, Germany

12th ASIM Conference
Simulation in Production and Logistics
September 26 – 27, 2006; Univ. Kassel, Germany

6th EUROSIM Congress
Sept. 10-14, 2007, Ljubljana, Slovenia
www.eurosim2007.org

ASIM Info and Contact

GMMS *Methods in Modeling and Simulation, P. Schwarz, FhG Dresden, schwarz@eas.iis.fhg.de*

SUGMBB *Simulation Environmental Systems and Medicine, Biology, Biophysic; J .Wittmann, Univ. Hamburg, wittmann@informatik.uni-hamburg.de*

STS *Simulation of Technical Systems, A. Wohnhaas, debis Systemhaus GEI, Achim.Wohnhaas@t-systems.com*

SPL *Simulation in Production and Logistics, S.Wenzel, Univ. Kassel, s.wenzel@uni-kassel.de'*

SVS *Simulation of Transport Systems, U. Brannolte, Univ. Weimar / Ulrich.Brannolte@bauing.uni-weimar.de*
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AK SBW *Simulation in OR, C.Böhnlein, Univ. Würzburg boehnlein@wiinf.uni-wuerzburg.de*

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CSSS - Czech and Slovak Simulation Society

General Information

CSSS (The Czech and Slovak Simulation Society) has about 130 members in 2 groups connected to the Czech and Slovak national scientific and technical societies (Czech Society for Applied Cybernetics and Informatics, Slovak Society for Applied Cybernetics and Informatics -SSAKI). The main objectives of the society are: development of education and training in the field of modelling and simulation, organising professional workshops and conferences, disseminating information about modelling and simulation activities in Europe to its members, informing the members about publishing in the field of modelling and simulation. Since 1992 CSSS is a full member of EUROSIM

Past Event

The 2nd International Workshop NETSS "New Trends in System Simulation" took place on 24th and 25th of February in Krnov, Czech Republic. About 22 participants from Czech and Slovak republics attended the conference.

The 39th International Conference on "Modelling and Simulation of Systems"(MOSIS'2005) that took place from 19th to 21stof April 2005 in Hradec nad Moravicí, Czech Republic, was organised by the Department of Computer Science FEEI VŠB – Technical University Ostrava and Faculty of Information Technology, University of Technology Brno and sponsored by CSSS, ASU EUROSIM and SCS. The Conference was connected with conference ISM'2005 - of Information System Implementation and Modelling. Some 70 participants from Czech republic, Slovakia, Poland, and Germany attended the conference. It was our pleasure to have prof. Borut Zupancic, president of EUROSIM as the key speaker at the conference.

The 8th International Conference „Informatics 2005 took place in Bratislava, Slovak republic on June 20-21, 2005. Conference was organised by the Slovak Society for Applied Cybernetics and Informatics-SSAKI, Alexander Dubcek University of Trencin, Institute of Informatics, Slovak Academy of Sciences, Bratislava and House of Technology of Association of Slovak Scientific and Technological Societies Bratislava Ltd, in cooperation with the Slovak Republic Government Office. The chairman of the international organising committee is academician Prof. Dr. Ing. Ivan Plander.

Some of the interesting presentation were: "Servis oriented Architecture (Metropolis Metaphor) Republic" by Ing. Simoncic, Microsoft Slovakia, a.s., "Simulation of Soft Systems" by Javor A., International McLeod Institute of Simulation Sciences Hungarian Center, Hungary, "Systems of Communicating Contextual Systems", by Ezkhova I., International Institute of Applied Technologies, Brussels, Belgium and "Information Systems Development" by Kutschke R., University of Technology, Berlin, Germany. The major partners of the Conference was HP Slovakia, Oracle, IBM Slovakia, Telenor and general partner of conference was SAP Slovakia..

Coming Events

ASIS'2005

27th International Workshop
„Advanced of Simulation Systems"

September 6 - 8, 2005
Přerov, Czech republic

The 27th International Workshop „Advanced of Simulation Systems" (ASIS'2005) will take place in the Moravian town St. Hostin, Czech republic on September 21-23, 2005. The chairman of the international organising committee is Dr. Ing. Jan Stefan.

MOSMIC'2005

5th International Workshop "Modelling and Simulation in Management Informatics and Control"

October 11-13, 2005
Zilina, Slovak republic

The 7th International Workshop "Modelling and Simulation in Management Informatics and Control" (MOSMIC'2005) will take place on October 11-13, 2005 in Zilina, Slovak republic, organised by the Faculty of Management, Control and Informatics - University of Žilina, Slovak Society for Applied Cybernetics and Informatics, Bratislava and CSSS. The chairman of the international program committee is Prof. Mikulas Alexik.

Information

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CROSSIM - Croatian Society for Simulation Modelling

General Information

We are very happy that EUROSIM Web Site has been set up and all basic information regarding our Society already is accessible at

www.eurosim.info

More information and news about the Society activities will be available and regularly updated in the near future.

Activities

During the period from the last report in SNE 41/42 CROSSIM has been active in several of its centres. Following is the report of the activities at Ruđer Bošković Institute prepared by Professor Tarzan Legović, PhD.

At the Ruđer Bošković Institute (http://www.irb.hr) a number of seminars on bioinformatics have been held. In October 2004 a new international Ph.D study on environmental management opened its doors to the first group of students. The study is organized jointly by the University of Zagreb, R: Bošković Institute and the American Chamber of Commerce. The first two semesters have been completed including courses in statistical simulations, environmental physics simulations, risk analysis, ecological-economy simulations, ecological modelling and simulations. During the fall of 2005, within the third semester, more simulation courses will be offered in connection to case studies. The beginning of 2005 also marked the start of participation in ECASA (Ecosystem Approach to Sustainable Aquaculture), an EU funded project in which models simulating impact of aquacultures to the marine ecosystems will be tested and further refined. Simulation of effects of demersal (benthic) fishery in the Adriatic Sea revealed overfishing on a number of predatory species including extinction of several species from previously abundant zones. These findings will play a key role toward further strengthening management of fishery in the Adriatic Sea. (Further information from T. Legović at legovic@irb.hr).

Past events

The Society cooperated with the University Computing Centre, Zagreb, in organization of international conference Information Technology Interfaces (ITI) that traditionally has a strong modelling and simulation section.

The 27th Conference *Information* Technology *Interfaces ITI 2005* was held on June 20-23, 2005 in Cavtat near Dubrovnik under the auspices of Ministry of Science, Education and Sports.

Student Paper Competition for undergraduate and graduate students (with prizes sponsored by Microsoft Hrvatska and SAS Institute) was featured for the second time at the ITI Conference and two golden and three silver winners were choosen.

Conference Proceedings is printed and includes all the contributed papers and poster abstracts. A selection of papers will be recommended for publishing in the following international journals: *CIT Journal of Computing and Information Technology*; *IMACS Journal Mathematics and Computers in Simulation* and *INFORMATICA*.

ITI 2005 Conference participant enyoed a round trip by boat which was a part of social programme

Coming Events

The 28th annual Conference *Information Technology Interfaces ITI 2006* will be held in Cavtat near Dubrovnik on June 19-22, 2006 and Preliminary Call for papers and posters is already announced and details are available at

http://iti.srce.hr/pdf/PRELIMINARY2006.pdf.

ITI 2005

28th Conference Information Technology Interfaces, June 19 - 22, 2006

Cavtat near Dubrovnik

The special topic/session entitled *E-learning: Opportunities and Challenges for Learning and Teaching* is announced. Modelling, Simulation and Optimisation is again one among Conference topics of interest. The deadline for the submission of camera ready full papers and poster abstracts is February 1, 2006.

Jadranka Božikov, CROSSIM President
jbozikov@snz.hr

DBSS Dutch Benelux Simulation Society

General Information

The Dutch Benelux Simulation Society (DBSS) was founded in July 1986 in order to create an organisation of simulation professionals within the Dutch language area. DBSS has actively promoted creation of similar organisations in other language areas. DBSS is a member of EUROSIM and works in close cooperation with its members and is further affiliated with SCS International, IMACS, and the Chinese Association for System Simulation and the Japanese Society for Simulation Technology.

The Steering Committee of DBSS consists of the following members: A.W. Heemink (TU Delft), Chairman, L. Dekker, Vice-Chairman , W. Smit (E&E Consultants, Inc.), Secretary and Treasurer, Th.L. van Stijn (Royal Dutch Meteorological Institute/KNMI).

Membership - Information

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:

1. Euro 34,- individual member or Euro 68,- institutional member, which means that you will receive the newsletter Simulation News Europe two times a year (one double, one single issue).
2. Euro 68,- individual member or Euro 114,- institutional member, which means that you will receive the Journal Simulation Practice and Theory eight times a year, and Simulation News Europe two times a year (one double, one single issue).

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.

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

Dutch Benelux Simulation Society
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FRANCOSIM - Société Francophone de Simulation

FRANCOSIM was founded in 1991 and aims to the promotion of simulation and research, in industry and academic fields. Francosim operates two poles.

Pole "Modelling & simulation of discrete events systems"

To improve the necessary synergy between industry and academia workers in the area of system modelling, the pole co-organises the series of conferences "MOSIM" (Modelling and Simulation).

Pole contact: Professor Henri Pierreval,
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Pole "Modelling & simulation of continuous systems"

This pole has launched in 1999 a series of conferences on modelling and simulation in medicine and biology (BioMedSim).

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French speaking activities

The **MOSIM Conference** is now an essential place for French-speaking researchers in Computer Science and Operations Research working on various aspects of modelling and simulation. MOSIM is now an established forum for theorists and practitioners that are concerned with the development of simulation, operations research, decision support, analysis, design and optimization of industrial and logistic systems.

MOSIM '06

Modelling and Simulation Conference, April 2006
Rabat, Marocco

The next edition of the MOSIM conference will be organized in Rabat in Morocco (April 2006) by two engineering schools: the EMI (Ecole Mohammedia d'Ingénieurs) and the ENIM (Ecole Nationale de l'Industrie Minérale).

PSCS - Polish Society for Computer Simulation

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

At present PSCS counts 262 members. The Board consisting of the following persons directs the affairs of the PSCS: Andrzej Tylikowski (President), Leon Bobrowski and Andrzej Chudzikiewicz (Vice Presidents), Zenon Sosnowski (Secretary), Zdzislaw Galkowski (Treasurer), Roman Bogacz, Jaroslaw Rybicki, Andrzej Grzyb (Members).

Activities. The main activities of the Polish Society for Computer Simulation are annual conferences known as „PSCS Workshops on Simulation in Research and Development": Mielno (1994), Warszawa (1995), Wigry (1996), Jelenia Gora (1997, 1998), Bialystok & Bialowieza (1999), Zakopane – Koscielisko (2000), Gdansk-Sobieszwo (2001), Osiekik/ Koszalina (2002)., and Zakopane (2003).

The annual PSCS Workshop on Simulation in Research and Development took place on September 1-4, 2004 in Bialystok&Augustow, Poland. The 75 papers of the workshop covered the following areas: simulation in mechanical engineering, simulation in mathematical problems, artificial intelligence and simulation, simulation in transportation, neural nets and simulation, simulation in automation and control, and simulation tools.

Publications. Proceedings of the 11th PSCS Workshop on „Simulation in Research and Development L. Bobrowski and A. Tylikowski (Eds.), Warszawa, 2005, (in Polish). The price is 30,- PLN.

Coming Events. Prof. A. Chudzikiewicz will organize the 12th PSCS Workshop on „Simulation in Research and Development" in September 15 – 18, 2005. More info via email: ptsk@it.pw.edu.pl

12th PSCS Workshop

„Simulation in Research and Development "

September 15 – 18, 2005

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HSS Hungarian Simulation Society

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

Activities. At the Department of Information and Knowledge Management at the Faculty of Economic and Social Sciences of the Budapest University of Technology and Economics classes "Simulation and Modeling in Economy" and an other "Decision Making and Management using Simulation" as well as simulation laboratory practices are held for graduate and postgraduate students studying economy, informatics and electrical engineering. Ph.D. students participate in various simulation research projects aimed at methodological basic research as well as applications of simulation mainly in the fields of traffic, economic and interdisciplinary problems.

In the town of Gyor at the Szechenyi Istvan University simulation is also taught. Here the class "Simulation Methodology and Applications" is studied by undergraduate students of informatics, electrical and traffic engineering. Lately a new specialization called "Informatics in Economy" was started, with simulation as a basic subject.

Conferences. We have participated at EUROSIM and SCS conferences and presented our simulation results. Professor András Jávor, chairman of HSS has been invited to organize a track on Education at the Summer Computer Simulation Conference in San Jose, USA. Professor András Jávor – as member of the Board of Directors of EUROSIM – beyond having participated and giving presentation at the EUROSIM Congress in Paris, also participated at the board meeting and in the election of the next president and preparation of the next congress.

Our members have been and are successfully participating in national and EU simulation projects.

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ROMSIM - Romanian Modelling and Simulation Society

ROMSIM has been founded in 1990 as a non-profit society, devoted to both theoretical and applied aspects of modelling and simulation of systems.

At the initial moment **ROMSIM** has started with 40 members but the number of members has increased. ROMSIM currently has about 100 members from both Romania and Republic of Moldavia. The main objectives of ROMSIM are: development of new methods and instruments of modelling and simulation of systems, development of new application of modelling and simulation of both natural systems and those created by man, development of education and training in the field of modelling and simulation of systems. An other important objective of ROMSIM is organization of national scientific events in the field of modelling and simulation and participation at international conferences. In April 1999 ROMSIM has been accepted as an observer member of EUROSIM.

Past Events

ROMSIM has developed in the last time a lot of activities in both scientific and information field, as for instance: organization of scientific conferences and seminaries in modelling and simulation of systems, information of ROMSIM members on international conferences also. ROMSIM helped the organization of the 9th IFAC/IFORS/IMACS/IFIP Symposium on *Large Scale Systems: Theory and Applications*, held in Bucharest in July 2001. Several members of ROMSIM presented communications in the frame of this Symposium and/or chaired Technical Sessions. Some ROMSIM members developed activities in the frame of 15th IFAC World Congress, Barcelona, Spain 2002; several members of ROMSIM presented scientific communications. Taking into account the prestige of IFAC-International Federation of Automatic Control the acceptance of some papers of ROMSIM members to be included in the program of the IFAC Congress can be seen as a success. A member of ROMSIM has participated at MATHMOD Conference 2003 organized at TU Vienna.

At the demand of Prof. Yskandar Hamam, Past EUROSIM President, a ROMSIM member was proposed for international programme committee of BioMedSim03 conference. An important contribution was given by some ROMSIM members to the scientific organization of the EUROSIM Congress 2004 in Paris. Five papers have been presented by six authors, in different field of modelling and simulation of systems, Expert Systems for simulation and control and applications.

ROMSIM has also contributed to organisation in the last years of two scientific seminaries. The first seminar was entitled *'Fuzzy Sets and Fuzzy Logic'*, and was organized by Prof. Paul Flondor and Dr. Mircea Sularia, both from University Politehnica Bucharest. The second one was entitled *Image Processing and Imagistics* and was organized by Prof. Radu Dobrescu assisted by Prof. Prof. Paul Flondor and Dr. Mircea Sularia, all from University Politehnica Bucharest. These seminaries were followed by 15 to 20 persons.

Present and Coming Events

ROMSIM is active in informing members about the main scientific events as: Congresses, Conferences, Symposia, and Seminaries, Workshops a.s.o. in such field as: modelling of systems, simulation of systems, optimisation, and control of systems, including both theoretical and applied aspects. Some ROMSIM members have sent papers to Organizing Committee of the IFAC World Congress to be hold in Prague, Czech Republic, in July 2005. ROMSIM is involved in organization of the periodic scientific seminary titled *Computational Genetics and Fuzzy Sets*; 15 to 20 specialists attend the reunion of the seminary.

An other important activity is the publishing of books in the field of modelling and simulation. Such a book is *Modelling of High Complexity Systems with Applications*, by dr. Florin Stanciulescu, published by WIT Press of Wessex Institute of Technology, UK. A presentation of the book can be found on the site of the WIT Press and an Advanced Information Leaflet can be obtained from WIT Press or from the author.

Publications

The ROMSIM community is involved in publication of a scientific journal entitled *Revista Romana de Informatica si Automatica* (*Romanian Journal of Informatics and Automatics*). This is the Journal of Romanian community of informaticians and automaticians and periodically is dedicated to modelling and simulation of systems. Some ROMSIM members are authors of books (Research Monographs, Lecture Notes etc). The most recent example is the book entitled Modelling of High Complexity Systems with Applications (see above). An other component of publicistic activity of ROMSIM community are the articles published in Scientific Journals. A List of published articles will be included in a separate page of site.

The members of our Society have attended the EUROSIM Congresses from Vienna (1995), Helsinki, (1998), Delft (2001), and Paris (2004). An other page of site will be dedicated to participation of ROMSIM members to EUROSIM Congresses.

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SLOSIM

Slovenian Society for Simulation and Modelling

General Information. SLOSIM (Slovenian Society for Simulation and Modelling) was established in 1994 and became the full member of EUROSIM in 1996. Currently it has 73 members from both Slovenian universities, institutes, and industry. It promotes modelling and simulation approach to problem solving in industrial as well as in academic environments by establishing communication and cooperation among the corresponding teams.

News. In the last period the following activities can be itemized:

- In December 2004, the president of EUROSIM, prof. Zupančič informed SLOSIM members about the new EUROSIM 2007 congress homepage: www.eurosim2007.org
- SLOSIM executive board meeting took place in March at the Faculty of Electrical Engineering where Zupančič presented the status of actions connected to EUROSIM 2007 congress in Ljubljana, stressing the future activities (committee formation, sponsors and exhibitors animation, lists of potential participants, etc.). The SLOSIM president prof. Karba reported about the visit in a Slovenian factory where the visit of SLOSIM members will be organised this year.
- In April the lecture of SLOSIM vice-president dr. Žlajpah on the role of modelling and simulation in robotics was organised for the SLOSIM members.
- The SLOSIM members were promptly informed about the interesting events in the field of modelling and simulation.
- The SLOSIM members were especially animated to participate in the MATHMOD 06 congress in Vienna, next February.
- The leaflets about EUROSIM 2007 congress were distributed in some corresponding world meetings.
- The activities connected with the modelling and simulation sessions organisation on Slovenian ERK'05 conference were undertaken.

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SIMS - Scandinavian Simulation Society

www.scansims.org

SIMS is the Scandinavian Simulation Society with members from the four Nordic countries Denmark, Finland, Norway and Sweden. The SIMS history goes back to 1959. SIMS practical matters are taken care of by the SIMS board consisting of two representatives from each Nordic country. The SIMS annual meeting takes place at the annual SIMS conference or in connection to international simulation conferences in the Nordic countries.

Sims Structure

SIMS is organised as federation of regional societies. There are FinSim (Finnish Simulation Forum), MoSis (Society for Modelling and Simulation in Sweden), DKSIM (Dansk Simuleringsforening) and NFA (Norsk Forening for Automatisering).

Membership, SIMS Board

- Peter Fritzson, chairman
- Erik Dahlquist, Brian Elmegaard, Anne Elster, Kaj Juslin, Esko Juuso, Bernt Lie, Kim Sörensen
- Vadim Engelson is SIMS coordinator for practical matters.

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

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To become a member of SIMS you should join one of the SIMS member organizations, as specified on the SIMS web page: www.scansims.org

Past Events

The **4th Modelica conference** was organized by Modelica Association and Department of Thermodynamics, Hamburg University of Technology, Match 7-8, 2005. Modelica is an object oriented language for component based modelling of complex physical systems containing mechanical, electrical, control and other components. Models in Modelica are described mathematically by differential, algebraic and discrete equations.

There were 160 participants from industry and academia. The conference included four tutorials, two days of presentations in scientific sessions as well as a poster session where totally 63 papers were presented. A number of software tools and industrial applications were demonstrated in the exhibition and vendor session.

Main topics were: Mechanical systems with rigid and flexible bodies; fuel cell modelling; thermodynamics, hydraulics, a number of other aspects in automotive simulation, targeted to complete vehicle simulation; modelling of thermal and nuclear plants, partial differential equation support in Modelica, model optimization, real time simulation and model debugging. The conference was evaluated as very successful by most participants; the proceedings are available online. More information at www.modelica.org.

The **4th BIOMEDSIM Conference** was organized by the department of Computer and Information Science, at Linköping University, Sweden, May 26-27 2005. This conference addressed all aspects of modelling and simulation in biology, medicine and biomedical engineering. It gathered 30 participants from many European countries; it included two keynote presentations and 18 paper presentations.

The main topics were: ecology modelling, biomechanics, muscular motion, simulation of infectious diseases, virtual-reality application in surgery, medical image processing, knowledge-based tools for cellular pathways. The conference demonstrated a growing number of applications in biology and medicine where advanced mathematical models are created; from these models successful and reliable simulation results are achieved. More information is available from www.scansims.org.

The **2nd annual SimSafe Conference** was organized by the department of Computer and Information Science, at Linköping Univ., Sweden, May 30, 2005.

This conference gathers scientists in the area of modelling and simulation in the interest of safety and security. There were about 25 participants from several European countries. It included a keynote speech of Anders Mattsson from SAAB Systems, as well as 11 paper presentations.

The main topics were: application of safety and security modelling in road traffic, robot operation and mining; verification and validation of computer models in order to increase safety and security; safe and secure interaction between human and computer based systems for rescue operations. More information is available from www.scansims.org.

The seminar on **Benefits of Simulation in Process Industry** was organized by Finnish Simulation Forum (FinSim) on the Baltic Sea between Helsinki and Stockholm, April 13-15, 2005. The special emphasis was on process automation. There were 16 presentations and a panel discussion on integrated simulation solutions industrial applications and control education. Main topics were process design and optimisation, dynamic simulation and process control, and computational fluid dynamics. Further information will become available in www.scansims.org

Coming Events

46th SIMS Conference

October 13 – 14, 2005
Trondheim, Norway

NTNU and SINTEF together with SIMS are arranging the 46th Conference on Simulation and Modeling 13-14 October 2005 in Trondheim.

The purpose of SIMS 2005 is to cover broad aspects of modelling and simulation and scientific computation. It will be of interest for model builders, simulator personnel, scientists, engineers, vendors, etc. The scientific program will consist of technical sessions with submitted and invited papers, and is open for poster sessions and vendor demonstrations.

Presented papers will be considered for publication in the EUROSIM scientific journal "Simulation and Modelling -- Practise and Theory (SIMPRA)" published by Elsevier Science.

Register electronically at the SIMS 2005 website on http://sims2005.idi.ntnu.no

Automation 2005

September 6 – 9, 2005
Helsinki, Finland

The forthcoming Automaatio Seminar Days September 6 – 9, 2005 organized by the Finnish Society of Automation will already be the 16th in the series. The Automaatio 05 Fair in conjunction with the Automation Seminar Days makes up the most important automation industry event in Northern Europe. It has traditionally taken place every second year.

The main language is Finnish but there will also be presentations in English. The Seminar Days will serve as a forum for professionals in the field of automation. More information is available from

http://www.automaatioseura.fi/autom05

SIMS Contact Address, Information

Updated SIMS web page: www.scansims.org

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UKSim United Kingdom Simulation Society

ducati.doc.ntu.ac.uk/uksim/

General Information

The UK Simulation Society (UKSim) has more than 100 members throughout the UK from universities and industry. It is active in all areas of simulation and it holds a biennial conference as well as regular meetings and workshops.

Membership, Information

Membership of the UK Simulation Society is very good value at only £20 per year including a subscription to Simulation News Europe. Those who attend the biennial conferences get free two-year membership until the next conference. For more information about the Membership please contact the Membership Secretary:

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Activities

The UK Simulation Society has held its annual meeting at Kingston University (London) in conjunction with the Kingston workshop on March 9. Important actions were taken as a result of the meeting to further develop the UKSim conference. The UKSim 2005 conference was declared an international conference and obtained the sponsorship of the IEEE UKRI Computer Chapter. These important changes are expected to largely increase the number of papers as well as the level of international participation at the conference within the next one to two years. The actual conference under the name of 8th International Conference on Computer Modelling and Simulation (ICCMS) was held in Oxford, St. John's College, April 6-8.

A total of 30 high quality papers, including 4 invited papers by industrial and academic keynote speakers, were presented at the conference. The first keynote address by Neil Bowerman, simulation specialist at Nestle UK, illustrated with on-line examples the costs and benefits of simulation in this important industrial sector. The second industrial keynote speaker, David Upton from Stirling Reid, presented actual cases of crisis management by means of simulation. From the academia, keynote speaker Frank Wang, chairman of the IEEE UK and RI Computer Society and director of the Cambridge-Cranfield High Performance Computing Facility, presented new and challenging developments in grid computing for implementation at the device level. The second keynote speaker from academia, Richard Zobel, former chairman of UKSim and visiting professor at Prince of Songkla University (PSU), after his retirement from the Department of Computer Science at Manchester University, illustrated the critical aspects of the December 2004 Tsunami and the key ideas to model the phenomenon based on his first hand experience just after the event in Phuket. The presentations were organised in 6 sessions covering the key modelling and simulation areas of Distributed Systems and Networks, Performance Models for Networks, Manufacturing and Production, Environment, Health and Human Models, Algorithms, Methodologies and Applications. Papers presented within these sessions generated a great deal of interest and discussion, and provided an opportunity for the instigation of future collaboration amongst participants. The social activities for the conference participants included one afternoon of sightseeing in Oxford, and a conference banquet at St. John's.

The Society held a second meeting at St. John's college, Oxford to finalise the planning for next year's conference and further plan for 2006/2007 activities. During the meeting it was agreed to hold the 2006 conference Oxford and to move the location of the 2007 conference abroad, possibly to the Far East. A special issue of the IJSSST on "Simulation Algorithms, Methodologies, and Applications" was published in June, including a selection of extended papers from the ICCMS conference (June 2005). Four issues of the journal were published earlier in 2005. These include a special issue on "Advances in Analytical and Stochastic Modelling" (January), a special issue on "Performance Engineering of Computer and Communication Systems" (February), and two special issues including "Selected Papers from 2004 European Simulation Symposium" (March/April).

The society is significantly involved in the organization of the European Simulation Multi-Conference (ESM) series recently renamed as the European Conference on Modelling and Simulation (ECMS) to reflect important changes in the organisation. The chairman of the society, Professor David Al-Dabass, is in fact the director of this conference series and several members of the UK Simulation board participate in conference and track chairing duties. This year the ECMS conference was held in Riga, Latvia, on June 1-4 and was a major success, with over 160 papers and wide representation of delegates from all continents. The Society will strongly contribute to the organisation of the 2006 ECMS conference to be held in Bonn, on May 28-31.

A special issue of the IJSSST on "Simulation in Technology, Processes and OR" will be published

later this year including a selection of extended papers from the corresponding ECMS 2005 track. Four other issues of the IJSSST including a wider selection of the best papers from the ECMS 2005 conference will be published early in 2006. All issues are available online. An example issue may be found at:

http://ducati.doc.ntu.ac.uk/uksim/journal/Vol-5/No-3&4/cover.htm

The society would like to encourage individuals and university libraries to subscribe to the journal. The cost of one full year subscription is £297 for individuals, and £495 for university libraries and institutions. Details are available on the website, or send a cheque or credit card details to Professor David Al-Dabass, Editor-in-Chief, IJSSST, School of Computing & Informatics, Nottingham Tent University, Nottingham, NG1 4BU.

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ISCS - Italian Society for Computer Simulation

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: Ing. Mario Savastano (Chairman), Prof. Franco Maceri (Vice Chairman), Dr. Paola Provenzano (Secretary), Prof. Pasquale Arpaia (Treasurer).

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AES Spanish Simulation Society

Spanish Simulation Society

No news received.

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SNE REPORTS EDITORIAL BOARD

www.argesim.org/sne/

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

SNE is registered with ISSN 1015-8685, continuing the ISSN 0929-2268.

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

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INTERNATIONAL SOCIETIES AND RESEARCH GROUPS

MATHMOD Conference Series

www.mathmod.at

The MATHMOD Conference Series was started with the first MATHMOD Conference in February 1994. In 1997, 2000 and 2003 the series was successfully continued by the second, third and fourth MATHMOD conference. The series has established as well-accepted and high-standing tri-annual conferences on mathematical modelling and simulation.

The conference series is run by the Inst. f. Analysis and Scientific Computing (I. Troch) of Vienna University of Technology, in close co-operation with ARGESIM (F. Breitenecker).

5th MATHMOD Vienna

5th Vienna International Conference on Mathematical Modelling

February 8 – 10, 2006; Vienna, AUSTRIA

The scope of the conference covers theoretic and applied aspects of the various types of mathematical i.e. formal modelling for systems of dynamic nature (deterministic, stochastic, continuous, discrete or hybrid, etc.). The conference will also deal with alternative modelling methods (e.g. cellular automata) and modelling for / in scientific computing.

The topics to be discussed will include e.g.

- modelling theory, processes and methods for model formulation, identification, development, reduction and validation
- automation of modelling and software aids for modelling, computer modelling
- qualitative modelling including fuzzy and iterative approaches to modelling
- modular modelling and interdisciplinary modelling
- learning networks / uncertainties in modelling
- methodologies for model validation
- fitting mathematical models to real processes
- relationship between the modelling approach and problem solutions
- comparison of methods for modelling, model reduction and model validation
- applications in the field of engineering systems and in natural sciences
- applications in other fields (such as environmental systems, biotechnology, etc.)
- case studies of comparisons for ideas or methods
- education in modelling
- modelling aspects in scientific computing

The **Scientific Programme** will consist of Invited Lectures, Regular Sessions, Organised Sessions, Poster Sessions, and Student Sessions. The Invited Lectures are:

- K. Schlacher (Austria)
  Mathematical Modeling for Nonlinear Control a Hamiltonian Approach
- R. Rabenstein (Germany)
  Continuous and Discrete Multidimensional Systems
- L. Zlajpah (Slovenia)
  Simulation in Robotics
- P. Schwarz, Germany
  Modelling and Simulation of Systems with Dynamic Structures

Social Programme will include Welcome Party, Heurigen Evening, and Reception. Program for Accompanying Persons will include the Social Programme and Guided Tours in Vienna.

Deadlines Papers

Submission Review Abstract	Oct. 21, 2005
Notification of Authors	Nov. 21, 2005
Full Paper and Proc. Abstract	Dec. 15, 2005

Deadlines Posters

Submission Review Abstract	Nov. 7, 2005
Notification of Authors	Nov. 21, 2005
Proc. Abstract	Dec. 15, 2005

Date and Place

Vienna University of Technology
Freihaus Building
Wiedner Hauptstrasse 8-10, A-1040 Vienna
February 8 -10, 2006 – All Sessions
February 7, 2006 - Workshops and Tutorials

For more information please visit the conference website www.mathmod.at or contact the conference chair:

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SimSummit Forum

Forum on the Future of the Modeling and Simulation Profession, Industry and Marketplace

SimSummit is an occasional forum – kept relatively informal by mutual agreement - of organizations with broad interest in M&S technology, professional development, industry and market.

Organizational membership includes Government, Commercial, Academic and Professional organizations; and members are expected to conform to established membership criteria. Membership is initiated by an official expression of interest by the applicant organization indicating its role in the M&S community-of-practice and its interest in participating in the *SimSummit* forum. Acceptance of the organization as a member of the forum is by consensus of existing member organizations as determined by the Executive Committee.

Meetings or activities host one representative from each participating organization. Each meeting event has a particular focus and is structured in accordance with the wishes of the Member organizations to produce the best possible collective effect. There are no fees except where an event engenders costs that need to be defrayed by a documented 'conference fee'.

The role of the *SimSummit* organization member representative is to speak with authority on behalf of the participating organization respecting organizational needs, interests, initiative, and accomplishments in the evolution of the M&S community-of-practice.

The particular virtue of the *SimSummit* forum is to 'find' the very considerable degree of common interest that exists even among relatively disparate organizations from Government, Industry, Professional Societies, and Academia. The objective of the *SimSummit* forum is no less than to significantly advance the evolution of the modelling and simulation profession, industry, and market.

W. Waite, F Cellier, W. Katz, and F. Lewis
SimSummit Executive Committee

ECMS - The European Council for Modelling and Simulation

ECMS, The European Council for Modelling and Simulation, (formerly known as SCS European Council) is an independent forum of European academics and practitioners dedicated to research, development, and applications of modelling and simulation.

The ECMS encourages its members to play active role in defining European research and development priorities in modelling and simulation through participation in ECMS conferences, contribution to community initiatives in modelling and simulation and a willingness to serve the ECMS members if elected to the Board. The ECMS encourages active collaboration with other simulation forums, such as the SCS, while offering a corporate representation of interest/priorities of European simulationists on the international scene.

ECMS Activities

The European Council for Modelling and Simulation serves all countries in Europe by organizing conferences and workshops, by organizing courses and tutorials, and by publishing books, CD-Rom publications, and conference proceedings. The two main conference series held in Europe are:

- European Conference on Modelling and Simulation (**ECMS**) - in June
- European Symposium on Modelling and Simulation (**ESMS**) - in October

These conferences were previously referred to as ESM and ESS respectively. In addition, conferences and workshops on various topics are organized or co-sponsored, such as the annual Agent Based Simulation conference **(ABS)** and the Harbour and Maritime Simulation workshops **(HMS**).

The ECMS is directed by the Board whose members serve for a period of three years. At present the board consists of Andrzej Bargiela (UK, Chairman), Yuri Merkuryev (Latvia, Secretary and Director of ESMS), David Al-Dabass (UK, Treasurer and Director of ECMS), Khalid Al-Begain (UK, Director of ASMTA), Miguel Angel Piera (Spain, member).

Info: office@scs-europe.net

Upcoming Conferences

17th ESMS Conference
October 20 – 22, 2005
Marseille, France

The 17th European Simulation Symposium and Exhibition will take place in Marseille, France. This year the Conference will be co-located with I3M, attracting an even larger world simulation community thanks to the new co-operation between IMCS and new SCS Europe, two major SCS Simulation Councils. The main target of this cooperation is to create a framework for supporting real networking and cooperations among scientist, technicians and users. One of our goals for this ESS'05 is to attract and motivate simulation users to present their innovative contributions where simulation techniques have been used to fill the gaps when solving new challenging problems. Based on the last year figures over 200 speakers are expected to present new advances in Modelling and Simulation in Marseille.

20th ECMS Conference

20th European Conference on Modelling and Simulation

May 28 – 31, 2006

Bonn, Germany

You are cordially invited to submit a paper and to participate in the 20th European Conference on Modelling and Simulation to be held at Bonn-Rhein-Sieg University of Applied Sciences near Bonn, Germany, from 28th – 31st May 2006.

ECMS 2006 is a conference in a long series of European Conferences on Modelling and Simulation sponsored or co-sponsored by the Society for Modelling and Simulation International, SCS. ECMS 2006 aims at bringing together researchers and practitioners from all regions of the new enlarged Europe as well as from outside Europe and aims at providing a forum for sharing modelling and simulation techniques, for the exchange of experiences and for supporting lively and interesting discussions among participants.

Volunteers who are renowned experts in their fields again have agreed to organise tracks which altogether span a broad spectrum of topics in Modelling and Simulation and allow for interesting synergy effects between disciplines. ECMS 2006 will build on the following tracks and collocated conferences.

- High Performance Computing in Simulation
- Simulation of Intelligent Systems
- Simulation of Complex Systems
- Bond Graph Modelling
- Vision and Visualisation
- Modelling and Simulation Methodologies
- Simulation in Industry, Business and Services
- Computational Modelling and Simulation in Science and Engineering
- Discrete Event Modelling and Simulation in Production, Logistics and Transport
- Simulation in Education/Teaching Simulation
- Computer Games and Simulation
- Simulation Application in Industry
- A special conference on Analytical and Stochastic Modelling Techniques and Applications, ASMTA 2006

Students are encouraged to submit poster presentation of either a recently finished or still ongoing research project they are contributing to.

The **Scientific Programme** of the conference will feature a keynote address and plenary speeches given by highly recognised personalities, parallel sessions and tutorials on Sunday, 28th May in the afternoon. Furthermore, there will be a best paper award.

The **Social Programme** will include a welcome party on Sunday, 28th May, in the evening, a conference dinner, guided tours to the cities of Cologne and Bonn, and a visit of one of the research centres being part of a network of cooperating institutions of higher education and research centres in the Bonn-Cologne region.

Bonn can be conveniently reached by airplane, railway, or by car.

Important dates are:

- Full Paper Submission Deadline: January 30, 2006
- Notification of Acceptance: March 8, 2006
- Registration & Camera-Ready Manuscripts April 10, 2006
- Conference May 28 – 31, 2006

It is planned to make available an online papers submission site in due course. Submission of papers implies the willingness of at least one of the authors to register and to present the paper, if accepted. Full manuscripts will be reviewed by at least two members of the International Programme Committee (IPC) of the track. Accepted contributions to a track will be included in the conference proceedings. Moreover, the authors of the best papers will be invited to submit an elaborated manuscript for possible inclusion in a special issue of an international journal.

For information about ECMS 2006, please check the conference web site or contact the conference chairs:

www.scs-europe.net/conf/ecms2006/
www2.inf.fh-brs.de

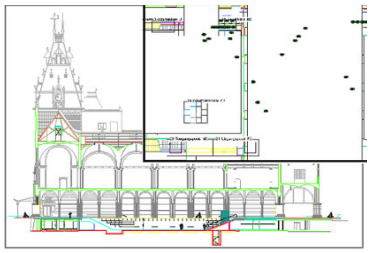
General Chair: Wolfgang Borutzky
ecms2006@inf.fh-brs.de

General Programme Chair: Alessandra Orsoni
a.orsoni@kingston.ac.uk

INDUSTRY NEWS

Enterprise Dynamics - Building the New Rijksmuseum

Countless small-scale renovations have 'clogged up' the Rijksmuseum, turning it into a building of labyrinthine proportions. On top of that, it has numerous features that no longer meet today's safety requirements, and modern concepts regarding the well-being of the museum's many visitors make an urgent call for new facilities. The starting point of the renovation is to restore light, air and architectural transparency to the building, and to design it so that it meets the needs of today's visitors.



Incontrol Enterprise Dynamics has developed simulation tools for the Dutch Railways to investigate traveller flows at train stations. These tools can also be used to investigate visitor flows within the Rijksmuseum. The Dutch Railways and Incontrol Enterprise Dynamics will assist the Rijksmuseum in investigating if proposed designs meet desired capacity and quality demands.

ED – Enterprise Dynamics – software comes with three professional versions, **Falcon Edition**, **Studio Edition**, and **Economy Edition**, with various suites supporting different application areas (logistics suite, airport suite, hospital & healthcare suite, etc.). The **Educational Suite** is offered for universities and other teaching organisations for a highly discounted price. Additionally, a free student version for institutes is available.

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The Netherlands
Tel +31-346-552500, Fax - 552451
www.EnterpriseDynamics.com

Scientific Computers distributes Maple 10

Scientific Computers, distributor for the German speaking area, starts distributing Maple 10, the newest version of the widely adopted Maple mathematical computation product line. Maple 10 significantly expands the type and complexity of problems to be solved.

Some highlights are:

- equations editor and palettes
- context menus,
- documentation mode,
- improved graphics and animation,
- ODE analysing, and much more.

Scientific Computers GmbH
Friedlandstrasse 18, D-52064 Aachen
Tel + 49 (0241) 40008 - 0, Fax – 13
info@scientific.de, www.scientific.de

MATLAB supports Distributed Computing

The MATLAB **Distributed Computing Engine** works with the **Distributed Computing Toolbox** to enable you to execute coarse-grained MATLAB algorithms and Simulink models in a cluster of computers. You can prototype and develop applications in the MATLAB environment and then use the Distributed Computing Toolbox to divide them into independent tasks. The MATLAB Distributed Computing Engine (available separately) evaluates these tasks on remote MATLAB sessions.

Some key features are:

- Distributed execution of coarse-grained MATLAB algorithms and Simulink models on remote MATLAB sessions
- Control of the distributed computing process via a function-based or an object-based interface
- Distributed processing on both homogeneous and heterogeneous platforms
- Support for synchronous and asynchronous operations
- Access to single or multiple clusters by single or multiple users

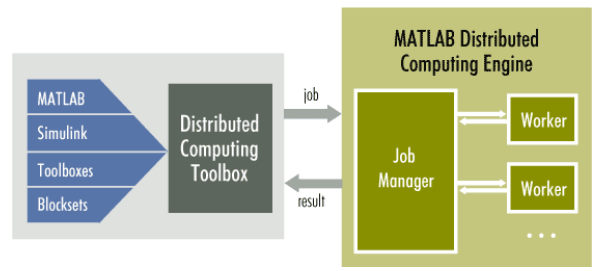

Figure: The interaction between the client machine, where the Distributed Computing Toolbox is used to define jobs and tasks, and the MATLAB Distributed Computing Engine

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