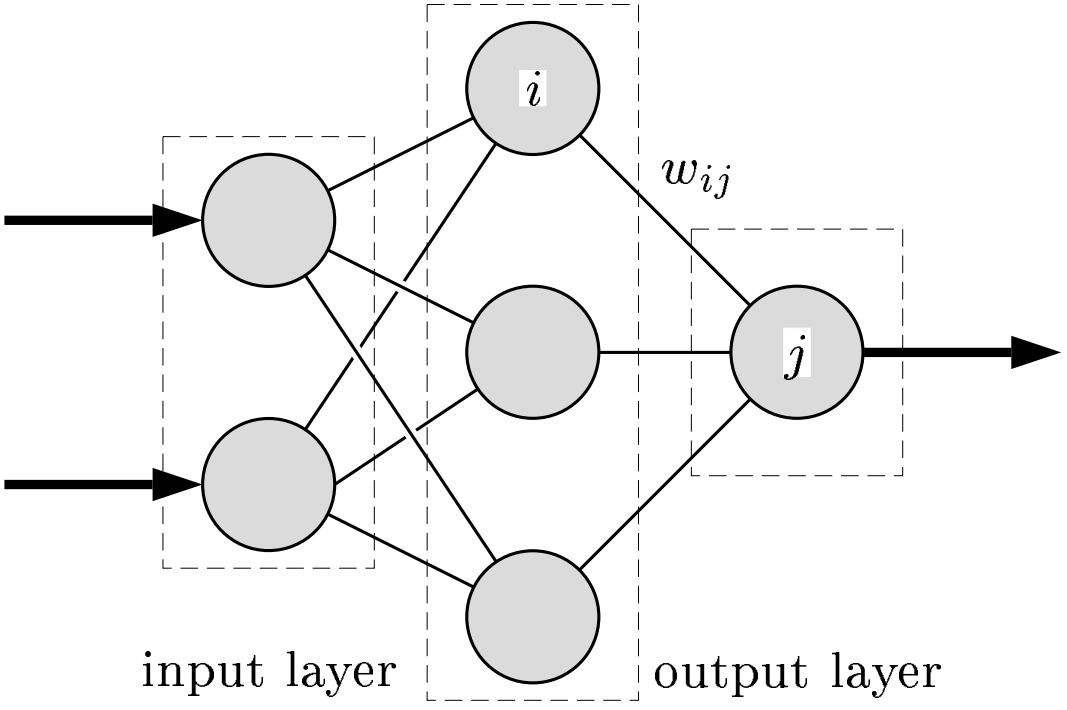
EUROSIM

SCS EUROPE

SIMULATION NEWS EUROPE



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Contents

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EUROSIM - Simulation News Europe

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

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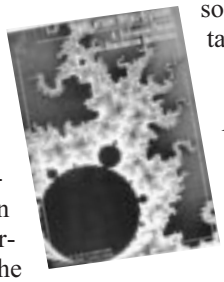
Editorial

Development of *Simulation News Europe* (SNE)

„We can do the job in Vienna". This sentence was the beginning of Simulation News Europe in autumn 1990. Felix Breitenecker and Wolfgang Kleinert offered with this sentence to edit and produce a newsletter for the European simulation societies, as successor to several issues of *Simulation News Europe* edited by Philippe Geril, SCS Europe (if you remember the cover you are a very experienced simulationist) and an intermediate issue, edited by Marja Dekker, DBSS.



The background: In September 1989, on the occasion of the European Simulation Congress in Edinburgh, several European simulation societies agreed to found the federation EUROSIM. Indeed, EUROSIM was then formally established in 1992, just before the EUROSIM Congress in Capri, organised by ISCS, the Italian simulation society. The founders were ASIM, DBSS, FRANCOSIM, ISCS, SIMS, and UKSC. In 1989, there were also other options – SCS, the world-wide simulation society offered to set up regional councils – instead of or in co-operation with the regional societies, and a lot of different scenarios were discussed.

The founding societies consented that

- there is a need for regional simulation societies, speaking the regional languages,
- there is also a need for a federation of these societies, representing the European simulation power,
- there is still a need for the world-wide simulation society SCS,
- and there can be no competition between SCS and EUROSIM, because EUROSIM is a federation of regional societies (EUROSIM's members are societies) and SCS is a personal-based society (SCS has individual members).

But after this decision it was also clear that SCS would not like to continue a newsletter under these conditions. So, in autumn 1990, representatives of EUROSIM's founding societies met and discussed the need and the production of a newsletter. ASIM's representatives were Wolfgang Kleinert and Felix Breitenecker. All agreed upon the need of a newsletter, and soon the sentence was uttered – ASIM became responsible for the newsletter.

Back in Vienna, fortunately Mrs. Husinsky, who had experience in editing national and international newsletters, agreed to help. W. Kleinert took over the job of director of a new large Computer Center at TU Vienna, so that he could support us further on only mentally.

The history: *EUROSIM - Simulation News Europe*, Number 0, appeared in November 1990. It contained information on EUROSIM, the EUROSIM societies and international societies, presentations of simulation centers, the definition of comparison 1, several advertisements, and a calendar of events. It had 28 pages (size A4) and was printed in Vienna.

In 1993 we started with SNE 8 a joint venture with Elsevier B.V. At that time EUROSIM's scientific journal *Simulation Practice and Theory* (SIMPRA), edited by Len Dekker, was initiated, and it was decided

- that SNE should be part of SIMPRA (3 times a year, as an addendum with 32/44 pages),
- that the members of the EUROSIM societies may subscribe to the scientific journal including SNE, while non-subscribers would get SNE separately, printed by Elsevier,
- and we would continue to be the editors SNE and deliver a camera-ready-copy to Elsevier for printing.

In 1997 we took up printing SNE in Vienna again. We decided to keep the format and the layout, we were allowed by Elsevier to use the well-known cover, and SNE 19 started with 60 pages.

The distribution: The diagram shows the circulation and distribution of SNE to societies and groups, according to their subscriptions.

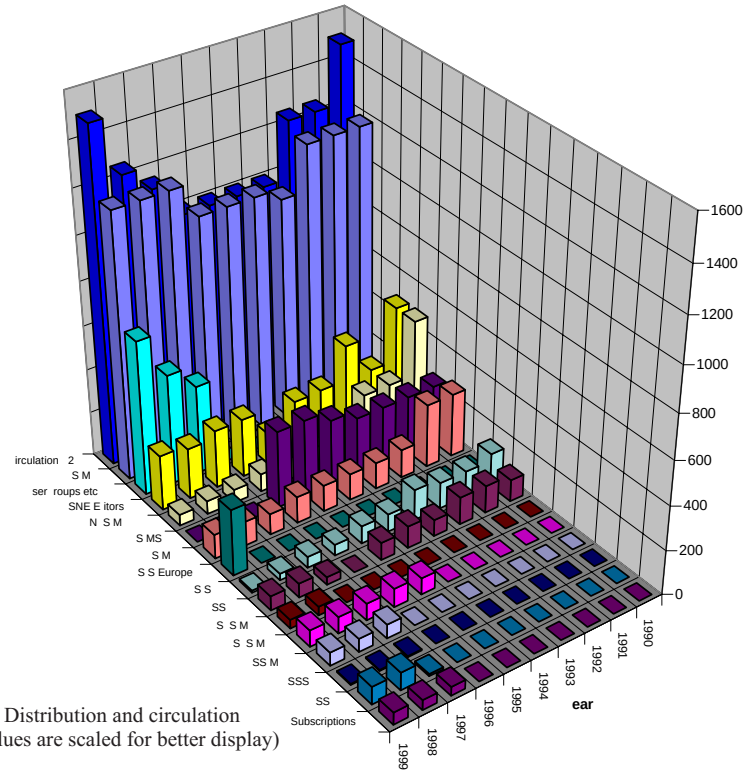
SNE started encouraging with a circulation of 3000 (SNE 0), and until SNE 6 the circulation and the orders stabilised, and we enriched the journal by essays, some kind of "technical notes", software presentations and

comparisons. The average number of pages per issue was 40, size A4.

During the time when Elsevier printed most societies ordered less copies of SNE, partly because of the relatively high price for SNE, partly because of a decrease of members in some societies (see diagram).

We also had problems with the page limit: in the first year SNE had only 32 pages, then 44 pages, with a smaller page size (size of SIMPRA). Therefore we were not able to publish all contribution and could not deal with new areas.

Another problem was the printing production: Elsevier is an excellent publisher for scientific journals, but Elsevier's system is not optimal for printing a newsletter like our's in a short time – there were turnaround times of up to 8 weeks. After 4 years, in the beginning of 1997 both parties, the editors and Elsevier, unanimously ended this joint venture. Elsevier was also unhappy with the fact that the societies did not order the expected 3000 separate issues of SNE. Unfortunately also the journal SIMPRA – with SNE as addendum – was not accepted to the extent Elsevier and EUROSIM had expected.



Distribution and circulation
(values are scaled for better display)

After that we were also faced with other problems, organisational and financial ones. On the one hand we had started to improve the service for the societies and the information on the web, on the other hand the EUROSIM societies ordered less copies of SNE. Unexpected was SIMS's decision to cancel all orders of SNE, continuing the society as a loose information group without any fee. So we lost the 2nd largest customer society.

Looking for solutions, in principle there were two options:

- Reducing SNE to a low-quality photocopied newsletter.
- Finding additional distributors.

We decided for the second option, and to be successful, we had to obey three conditions:

i. Opening SNE from "core simulation" to simulation-related areas

ii. Addressing all simulationists in Europe

iii. Operating on a correct formal basis.

Ad i) We contacted "simulation-related" groups, and we were surprised how many groups, societies, etc. are dealing with simulation, but calling it "computational physics", "financial engineering", "soft computing" etc. User groups (MATLAB, ACSL, MicroSaint) now also distribute SNE, if the issue puts an emphasis on their software. Furthermore closer contact we had with soft computing people, therefore this issue picks up this topic.

Ad ii) To be a forum for all simulationists we first went back to our roots and contacted SCS Europe, which services the SCS members in Europe. We addressed Eugene Kerckhoffs, Philippe Geril, and Rainer Rimane with respect to SNE and we found out that many European SCS members were not members of a EUROSIM society. As a result of the discussions from 1999 on SNE is also official membership journal for European SCS members.

Ad iii) The ARGESIM working group, consisting mainly of people from Vienna University of Technology is a legal non-profit group. It is the basis for organizing seminars, producing publications, main- taining the ARGESIM WWW server, which hosts EUROSIM and ASIM WWW information. As we are members of

this group, with a certain influence, SNE's formal home is ARGESIM.

The consequences can also be seen in the diagram: SNE is growing controlled, we are "coming back to the roots" (in circulation, in co-operation with SCS) and we are looking forward to servicing even more groups in the year 2000.

This issue: Since the first issue, SNE 0, a lot of changes took place, and this issue, number 25, again marks some new achievements:

- We are happy that SNE is now also the official membership newsletter for SCS Europe (this fact is also taken into account on the new cover), and furthermore SNE is also distributed by ACM/SIGSIM.
- We could increase the number of copies distributed in user groups by sponsoring (the main support comes from Scientific Computers, Germany).
- The non-profit working group ARGESIM is formally and legally responsible for SNE.

Special topic of this issue is "soft computing", featuring an essay, reports on societies and conferences dealing with soft computing, and several comparison solutions. You will find a general article about the comparisons, several presentations of simulation centers, and the usual sections with reports and news from the societies, book reviews, and a calendar of events.

The future: We are open for new subjects and areas related to modelling and simulation:

- SNE 25 and SNE 26 concentrate on developments in Soft Computing related to modelling and simulation.
- We will publish information (and comparison solutions) about algebraic/numerical tools.
- We are discussing how to inform about financial engineering and financial modelling and simulation, etc.

The new topics did not come up suddenly, they are the result of a nine years' process of development, with ups and downs. We were happy to be able to publish

now all incoming information, to set up new comparisons and stimulate new solutions, and we could broaden the spectrum.

The service: we put much effort into maintaining a WWW server for EUROSIM. Parts of SNE can be found on the web, partly as unstructured news, partly database driven in a highly structured form (comparison evaluation). This kind of web presentation has proven successful, and we thank Joost Kok from Elsevier, who taught us to distinguish between news information, non-structural information of archive value, and highly structured information of archive value with update needs.

Some statistics: we published in total 1200 pages, 32 essays, 164 comparison solutions , 86 book reviews, 34 presentations of simulation centers, 28 reports on software / simulation technique development, 372 society reports.

Acknowledgements: Producing SNE is a lot of work for us, but we also enjoy it (– especially when an issue is ready to go to print). It is nice to learn that our comparisons have become a certain standard, to hear that the societies appreciate the cooperation.

There are may people all over the world who support our work with their valuable input and whom we owe many good tips and ideas. Amongst them we would like to mention T. Schriber from University Michigan, D. Murray-Smith from University Glasgow, G. Korn from University of Arizona, and the editors of the simulation societies.

We have to thank many companies and organizations for finding SNE interesting and ordering (323) advertisements, which helped financing it all.

Last but not least we thank our coworkers, mainly the PhD students and research assistants of Prof. Breitenecker.

We hope, you enjoy SNE further on, and we are open to all questions, comments, hints for co-operations, etc.

F. Breitenecker, I. Husinsky

Simulation of Technical Processes via Universal Approximators

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Introduction

Methods for controller design, simulation and process analysis often require an analytical model. A common way to obtain a model is to use first principles resulting in a physical description of the process. This model type should be preferred if physical insight of the process or parameter studies are of interest. The bottleneck of this approach is the large effort for deriving the mostly complex equations and unknown parameters. Therefore approaches basing on simple equations with the capability of approximating nonlinear input/output (I/O) behavior are advantageous for simulation tasks since the equations are given by the user. The unknown parameters are identified applying suitable estimation methods. Very popular universal approximators are provided by fuzzy networks (FN) and neural networks (NN) which both have been applied successfully to many approximation tasks. Unfortunately a comparison with the alternative approach is missing which could ease the decision for one of both approaches when a new modeling task arises. This contribution intends to help a user by introducing two technical examples of nonlinear modeling using fuzzy and neural networks. For this purpose the basic ideas of both approaches are outlined in the next section followed by important aspects of identification concerning both. The examples of a hydraulic differential cylinder and a pneumatic drive are used to illustrate the capabilities with comprehensive results. Finally the conclusions will summarize the results and will recommend which approach to prefer.

Universal approximators

Fuzzy networks

In this paper fuzzy networks [1], also known as Sugeno fuzzy models [2], are considered. The basic idea is to describe the I/O relationship *locally* by linear equations

$$y_i(k) = \zeta_i - \sum_{j=1}^{n} a_{ij}\, y(k-j) + \sum_{h=1}^{m} b_{ih}\, u(k-h) \qquad (1)$$

and to compose them fuzzily yielding a globally nonlinear model. The composition is realized by weighting the local outputs y_i with the degree of fulfilment:

$$\hat{y}(k) = \sum_{i=1}^{c} \mu_i(k-1)\, y_i(k)\,. \qquad (2)$$

Figure 1 illustrates the basic idea and the structure of a fuzzy network.

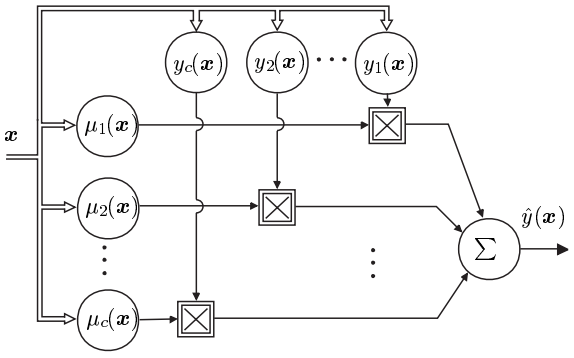

Figure 1: Structure of a fuzzy network

This contribution focuses on multivariate prototype based membership functions $\mu_i(k-1) = f(y(k-1), ..., y(k-n), u(k-1), ..., u(k-m))$ resulting in a more flexible partition and less parameters compared with triangular membership functions [1]. The identification of a fuzzy network using measured data is realized by a sequence of a cluster algorithm for the membership functions, the least-mean-squares method (LMS) for the coefficients in equation (1) and a nonlinear optimization of all parameters. A comprehensive mathematical description of the considered fuzzy networks as well as its efficient identification methods is given in [3, 4].

Neural Networks

An artificial neural feedforward network [5] consists of a number of single units (figure 2).

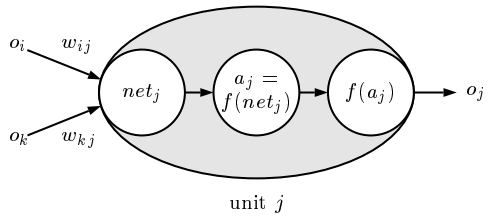

Figure 2: Structure of a unit

The single inputs o_i are weighted to a resulting input for a unit j by the *net* function

$$net_j = \sum_{i=1}^{N} o_i w_{ij} \; . \tag{3}$$

The result is used to calculate the activation of the unit by the so-called *transfer* function. Here we use the sigmoidal function

$$a_i = f(net_j) = \frac{1}{1+e^{-net_j}} \; . \tag{4}$$

To transform the activation into the output o_j of the unit j the *identity* $o_j = a_j$ is chosen. The single units are grouped into layers and all units of one layer are connected with the units of the subsequent layer. So a network is formed (figure 3). The input vector is propagated from the input layer through one or more hidden layer to the output layer, i. e. only in one direction. By propagating the input vector through the network to a resulting output, the capability of nonlinear I/O approximation is given.

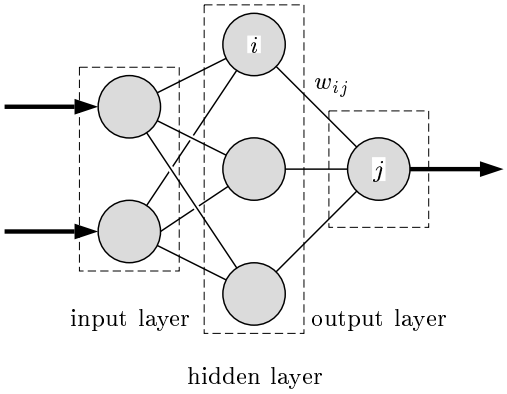

Figure 3: Structure of a feedforward net

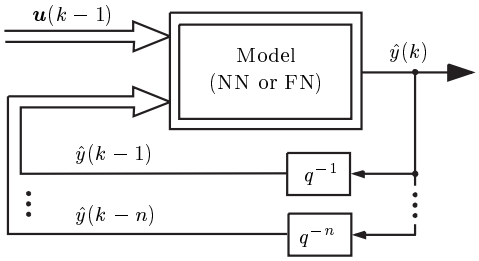

Figure 4: Parallel model evaluation

Dynamical models

Generally, the description given above refers to I/O models with any inputs. To obtain a dynamical model some of the inputs must feed the model with historical information of the output. If the *predicted* and not the measured output is fed back a so-called *parallel* model (figure 4) is designed. For both approaches a nonlinear optimization method based on the Levenberg-Marquardt [6] algorithm is used. Previous investigations confirm that it is worthy not only to feed back the models output for prediction but also during identification resulting in high prediction quality in validation [7].

Application 1: Hydraulic drive

First the capabilities of fuzzy and neural networks are carried out considering the hydraulic drive shown in figure 5. The piston is driven by an oil flow controlled by a 4-3-servo-valve. The operating pressure is p_0 = 50 bar.

Figure 5: Hydraulic differential cylinder

The piston is intended to move a load of $m_L = 600$ kg in horizontal direction. Nonlinearities are provided by the different piston areas resulting in different behavior for both directions. Moreover geometry and the elasticity of the oil that changes with the piston's position cause a nonlinear I/O behavior. The objective of identification is to predict the piston's velocity depending on the control action *u(k)*.

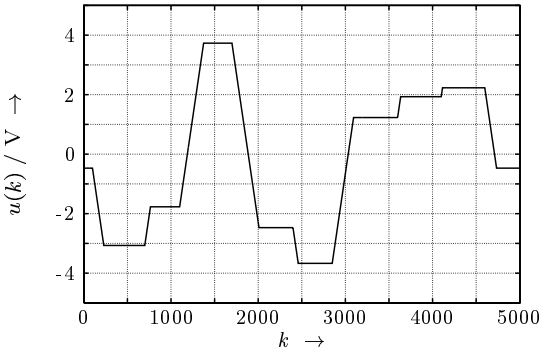

Figure 6: Control action for training

To create some training data the hydraulic drive is stimulated with the control action depicted in figure 6. Generally steps of the control action should be preferred to stimulate high order dynamics, but this would cause high acceleration forces damaging the plant. For this reason ramp signals have been used instead. Using the corresponding response measured with a sampling rate of $T = 2$ ms a fuzzy network with $c = 4$ fuzzy rules and a neural network with five input units, three hidden layers (each consisting of five units) and one output unit (5-5-5-5-1) are identified. As input variables *y (k – 1), y (k – 2), y (k – 3), y (k – 4), u (k – 4)* are used.

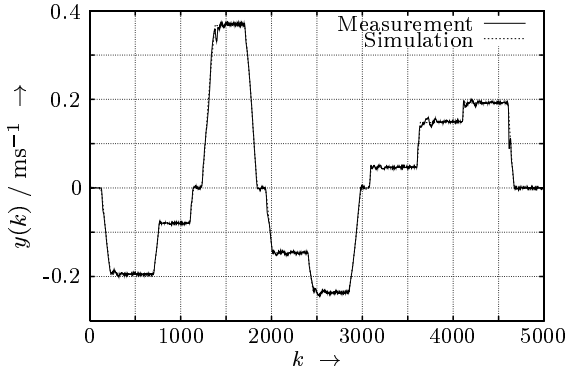

Figure 7: Training of the fuzzy network

The results of the identification are depicted in figures 7 and 8. Both approaches yield good results without significant prediction errors. The validation with a set of ramp responses (figures 9 and 10) demonstrates the high quality of both models by excellent steady state fitting. Consider that high order dynamics are not stimulated by control action to avoid high acceleration forces causing damage of the plant. Nevertheless the nonlinearities mentioned above are modeled sufficiently.

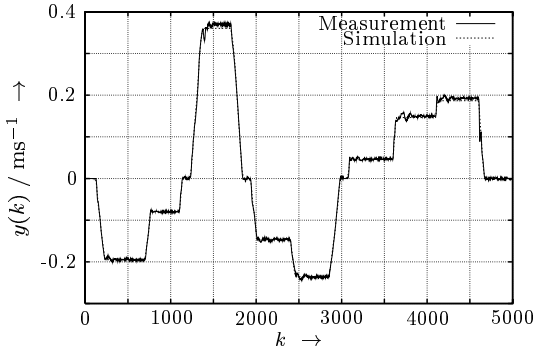

Figure 8: Training of the neural network

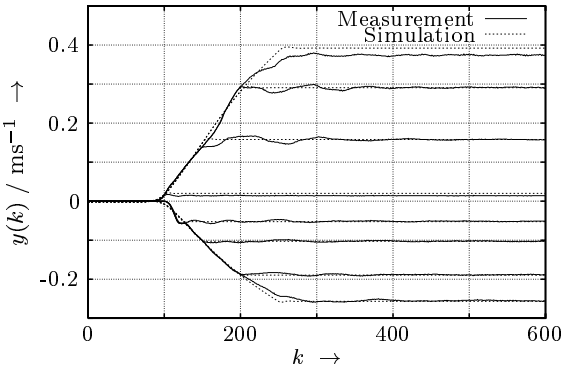

Figure 9: Validation of the fuzzy network

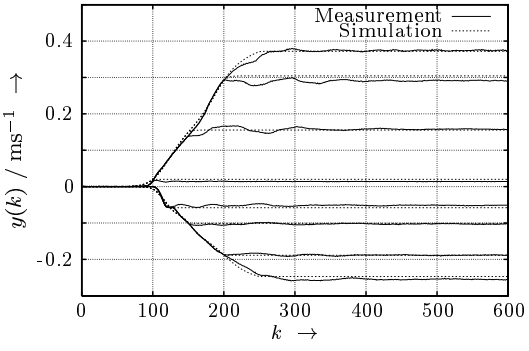

Figure 10: Validation of the neural network

Application 2: Pneumatic drive

An example of a MISO-system is provided by the pneumatic drive depicted in figure 11. The drive consists of a piston-rod-less cylinder supplied by compressed air. The air supply can be controlled by two servo valves.

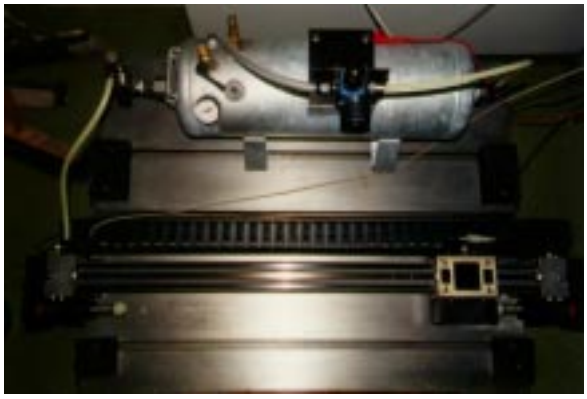

Figure 11: Test stand of a pneumatic drive

The pressures inside the two chambers can be controlled by setting the related currents. A theoretical model approach faces numerical uncertainties of the system parameters. Nonlinearities caused by friction and thermo-dynamical laws concerning the state of the air make modeling difficult. First approaches [8] illustrate good results using the external input $u\,(k-1)$ and historical values of the output $y\,(k-1), y\,(k-2), y\,(k-3)$. To improve the modeling of high order dynamics the approach is modified. Now the difference of the two chamber pressures $\Delta p\,(k-1)$, which are measured with a sampling rate of $T = 5$ ms at the valves outputs, is used as additional input substituting the input $y\,(k-3)$. A set of training data is created by stimulating the pneumatic drive by an amplitude modulated pseudo random signal (figures12 and 13) actuating valve 1, while the input current i_2 of the second valve is hold at a constant value.

The prediction of a fuzzy network with 4 rules is depicted in figure 14. The deviations between the models output and the measured values are very small since dynamics of the system are predicted satisfactory. Cross-validation, i. e. the evaluation of a new, not trained dataset is successful (figure 15).

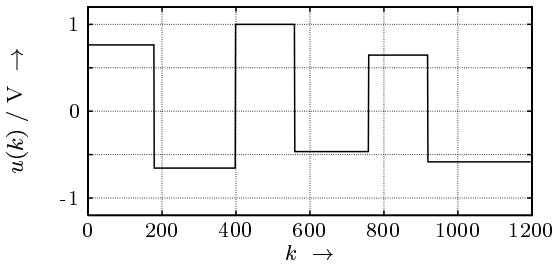

Figure 12: Control action for training

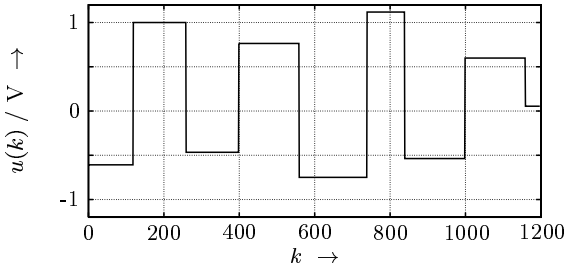

Figure 13: Control action for validation

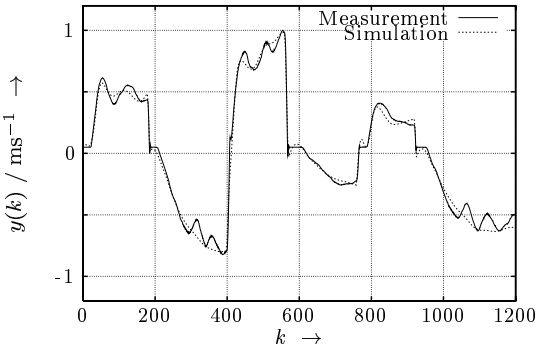

Figure 14: Training of the fuzzy network

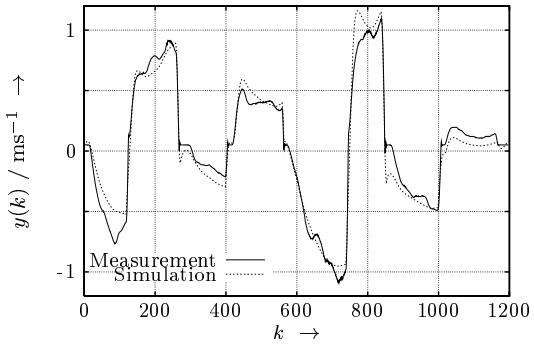

Figure 15: Validation of the fuzzy network

Figures 16 and 17 document the corresponding results of a neural network with two hidden layers (4-5-5-1) and a similar number of parameters as the fuzzy network. Both the identification and the validation results of the fuzzy and the neural network are nearly the same.

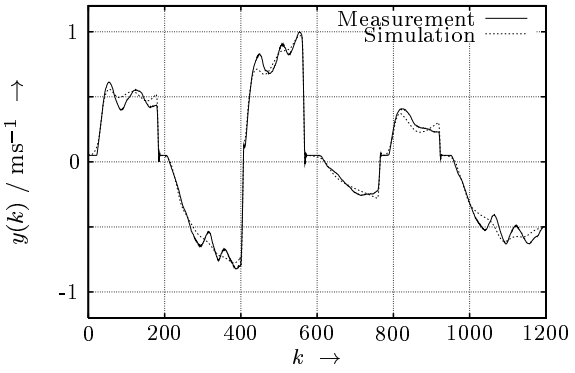

Figure 16: Training of the neural network

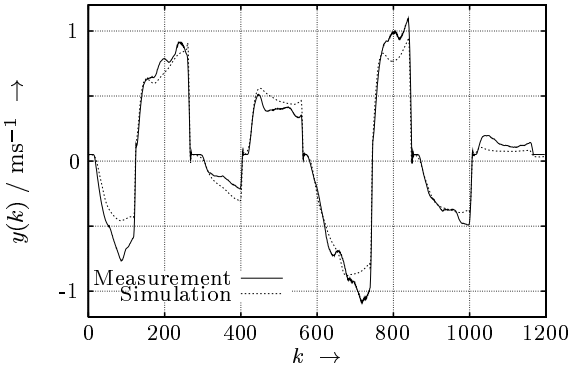

Figure 17: Validation of the neural network

Conclusions

This contribution considered fuzzy and neural networks as universal approximators providing capabilities for nonlinear black box modeling. Both approaches differ in their basic ideas and mathematical description. Fuzzy networks base on locally linear models resulting in an overall nonlinear description by nonlinear weighting of the local models. In contrast neural networks are constructed of smaller units with nonlinear transfer functions. The case studies of a hydraulic differential cylinder and a pneumatic drive illustrate that both approaches are suitable as well. The key to obtain high quality models lies in creating representative training data and applying suitable identification methods, i. e. to identify *parallel* models. This is more difficult than the identification of serial-parallel models but is rewarded with good validation results. Because of the similarity of the results other aspects like knowledge about one of the approaches and/or the availability of identification tools become more important in making a decision for one of both approaches.

Acknowledgement
This work was partly (T. Bernd) supported by the German Federal Ministry for Education, Science, Research and Technology (BMBF) grant No. 16 SV 255/6 which is greatly appreciated.

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EUROSIM – the Federation of European Simulation Societies

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

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

The EUROSIM Congress is arranged every three years in Europe. EUROSIM'98 took place in Helsinki, April 14-17, 1998. The 4th EUROSIM congress will take place in Delft, The Netherlands, June 26-30, 2001.

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

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

EUROSIM societies are offered to distribute to their members the news journal *Simulation News Europe* (SNE) as official membership journal. Furthermore members can subscribe the scientific journal *Simulation Practice and Theory* (SIMPRA) at a significantly reduced price.

Further information can be found on the EUROSIM WWW Server: **http://www.eurosim.org/**

F. Breitenecker

Triennial EUROSIM Congress in 2001

EUROSIM has asked DBSS to organize its triennial congress in 2001. In this capacity, DBSS is free concerning the organizational activities of the congress, e.g. it could ask the support of SCS Europe BVBA, the organisational/financial office behind the SCS European Council. DBSS is obviously not free to combine the 2001 congress with another congress without the prior approval of the EUROSIM Federation. If the Federation has given such approval, then DBSS can find out whether the proposed cooperation is possible and inform EUROSIM, whereafter the realisation of a combined congress can follow.

With a view to the last point, last year DBSS started discussions with SCS Europe BVBA, in order to investigate the possibility of combining their yearly ESM conference with the triennial congress of EUROSIM. So far fruitful discussions have taken place and are still going on. Some items have still to be discussed. For that reason an official written agreement between both parties has not been reached yet. The DBSS is however convinced that for EUROSIM as well as SCS Europe and also for the whole simulation community it is good that such cooperation takes place. So we express the sincere hope that we will reach an official agreement as soon as possible.

The congress will take place in the week **26-30 June, 2001**; the duration of the congress is not fixed yet, but we expect that it will be 4 days.

Venue: the Aula Conference Centre of the Delft University of Technology.

The working title of the congress is:

SHAPING FUTURE WITH SIMULATION.

At the end of May a final text will be prepared, which will become available on the website, mailed electronically to individual persons. We have the intention to mail a leaflet beginning September this year, dealing with among others the following information: * members of the organizing committee * members of the scientific committee * themes of the congress (taking into account the information we got via the questionnaires) * deadlines submission abstracts and full papers * preliminary social programme * congress fee * names of the invited speakers * information about the referee procedure * about the scientific exhibition * about the commercial exhibition * about poster sessions

Information about hotel accommodation and other items will become available later on the website.

A website is under preparation and will be accessible at the end of May.

Via the questionnaires DBSS got already names of links that can be made to other web sites. We kindly request all of you, that if you know links that can be added, please email them.

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

Congress 2001 Organisation
c/o Mrs. T. Tianova
Delft University of Technology
Faculty of Information Technology and Systems
P.O. Box 5031
2600 GA Delft, The Netherlands
Fax: +31 15 2787209
email: EUROSIM2001@pa.twi.tudelft.nl

If you need information by telephone please contact:

Mrs. Marja Dekker, Tel +31-10 5112714
or
Prof. Arnold Heemink, Tel. +31-15 2785813.

Marja Dekker-Genemans

Co-operation agreement between the Chinese Association for System Simulation (CASS) and EUROSIM

Last year, on August 8, 1998, a new agreement has been signed between CASS and EUROSIM. At this moment the President of CASS is Professor Wang Xingren. The purpose of the agreement is to promote co-operation between the two parties in the promotion and advancement of simulation on an international basis. A small liaison committee has been established with as task among others: * working out protocols regulating specific activities * identifying further common activity areas * introducing means for information circulation among parties. Members of this committee are: from the side from EUROSIM: Prof. Dr. F. Breitenecker, Technical University Vienna and Dr.ir. H.X. Lin, Delft University of Technology; from the side of CASS: Prof.Dr. Li Bohu, Beijing Institute of Computer Application & Simulation and Dr. Yang Yawei, Beijing University of Aeronautics and Astronautics.

We hope that in the future the already existing cooperation between the two parties will become more intensive and, where possible, more extended. With a view to these last points, I wish the members of the liaison committee every success.

L. Dekker, EUROSIM President

ASIM

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

Next meeting of the Board will be on April 30th in Hamburg, the location of ASIM's conference in 2000.

The board currently discusses improvements on the ASIM structure and for the ASIM conferences. If you have any comments or suggestions, please contact the vice-speaker Ingrid Bausch-Gall.

ASIM'99
13. Symposium Simulationstechnik
September 21 - 24, 1999, Weimar

The next ASIM conference will be in Weimar at the *Bauhaus-Universität*. In 1999 Weimar will be the cultural capital of Europe and will celebrate the 250th anniversary of Goethe.

Local organizer and chair of the programme committee is Prof. Dr. G. Hohmann. All aspects of modelling and simulation will be addressed:
* Modelling and Simulation Methods
* Simulation Hardware and Software, Simulation Tools
* Applications

Programme
September 22
Opening, Special Lecture: "*Goethe und die Naturwissenschaften*", Prof. Dr. Dorothea Kuhn, Deutsches Literaturarchiv Marbach am Neckar

Invited Papers
"*Simulationsmodelle im Verkehrswesen – erreichter Entwicklungsstand und Perspektiven*", Prof. Dr. Ulrich Brannolte, Bauhaus-Universität Weimar
"*Die Simulation im Entwicklungsprozeß*", Dr. Werner Dirschmid, Audi AG Ingolstadt
"*Simulation von Bauprozessen mit Hilfe von Petri-Netzen*", Prof. Dr. Volkhard Franz, Universität Gesamthochschule Kassel
"*Mikro-Makro-Simulation: Konzepte und Anwendungen*", Prof. Dr. Rolf Grützner, Universität Rostock
"*Schaltungssimulation – ein Überblick*" , Prof. Dr. Ernst-H. Horneber, Technische Universität Braunschweig
"*Simulation, Kognition und Emotion – kooperierende Agenten mit Verstand und Gefühl*", Prof. Dr. Bernd Schmidt, Universität Passau

Parallel Sessions, Tutorials, user Groups

Workshop zur VDI-Richtlinie "Simulation" and *Praxisforum "Elektroniksimulation"*

For information please contact:
Dipl.-L. Christine Rieger
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email: christine.rieger@uni-weimar.de
http://www.uni-weimar.de/veranst/asim.html
http://www.asim-gi.org/asim99/

Co-operation ASIM – SCS Europe

The relation between EUROSIM and SCS Europe is sometimes seen as competition. Viewing back to history and checking the intentions of both societies shows clearly that there should be no competition.

In June 1998, in Manchester the SCS ESM conference took place, supported by ASIM (D. Möller was program chair, ASIM members organised sessions).

On this occasion ASIM took initiative and discussed about co-operating with SCS Europe. It was a good opportunity, because people from the Boards of ASIM, SCS, and SCS Europe met there. The photo shows, from left to right, R. Crosbie, W. Ingalls, R. Zobel, R. Rimane, Ph. Geril, D. Möller, E. Kerckhoffs, and F. Breitenecker.

The results are:
i. SCS and ASIM will combine their book series (more information see page 32).

ii. In September 2000, ASIM and SCS Europe will risk a joint conference in Hamburg, a combination of the (German speaking) annual ASIM conference with the international conference ESS 2000.
iii. SCS Europe will service its members with SNE as official membership journal

Both sides were surprised by these essential results. Now, in the beginning of 1999, two of these points are realised, and it is no question that also the joint conference will take place. ASIM appreciates that also EUROSIM seems to seek co-operation in having plans to organise the EUROSIM 2001 congress jointly with the ESM 2001.

ASIM/ESS 2000, Hamburg

Both societies, ASIM and SCS Europe, decided for a closer co-operation in the field of simulation in Europe. To speed up this co-operation, in 2000 a joint conference will be organised, the ASIM/ESS 2000 Conference. This conference will be held from September 18 to 23, 2000 at the University of Hamburg. ASIM and SCS Europe designated Prof. Dr. D.P.F. Möller, Computer Science Department, University of Hamburg, as General Conference Chair of ASIM/ESS 2000.

Contact Addresses

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WWW-Information:
http://www.asim-gi.org/
Electronic Mail:
info@asim-gi.org (for information)
admin@asim-gi.org (for adminstration)

ASIM Meetings to come

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

March 14-16, 1999: *"Werkzeuge für Modellbildung und Simulation in Umweltanwendungen"* in Koblenz.

April 12-13, 1999: Workshop of the Working Group *"Simulation and Artificial Intelligence"*, Technical University of Chemnitz.

September 21-24, 1999: ASIM'99 *13. Symposium Simulationstechnik*, Weimar.

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

March 13-15, 2000: 7th symposium "*Simulation for managerial decision support – new tools and approaches in practice*" in Braunlage.

April 2000: Meeting of the FG *"Simulation in Biologie, Medizin und Ökologie"*.

September 18-23, 2000: ASIM/ESS 2000 will be held at Universität Hamburg.

Meetings with ASIM Participation

April 7-9, 1999: UK Sim 99. Fourth United Kingdom Simulation Society Conference, Cambridge, U.K.

February 2-4, 2000: 3rd MATHMOD, International Symposium on Mathematical Modelling. Vienna.

For contact information see calendar of events (page 64).

Working Groups (*Fachgruppen* FG)

"Verteilte Systeme und parallele Prozesse" (FG 1)

The main topics of the working group "Distributed Systems and Parallel Processes" are various modeling and simulation aspects :

- description methods and languages (e.g. Petri nets),
- parallel and distributed simulation,
- simulator coupling
- partitioning for parallelization, load balancing
- performance analysis,
- communication and synchronization principles,
- distributed computer systems,
- internet-based simulation (HLA, CORBA, ...)
- applications in different disciplines (electronics, mechatronics, telecommunications, ...)

The next activity is a workshop on March 3, 1999 in Magdeburg/Germany. Topics of presentations and discussions will be: partitioning for parallel simulation; performance analysis; distributed web-based simulation and optimization. Actual information may be found in the WWW:
http://www.eas.iis.fhg.de/asim/ws99

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

"Simulationssoftware und -hardware" (FG 2)

The working group is going to adapt it's goals with respect to the developments in modelling and simulation. Software and hardware were previously very important aspects for modelling and simulation of continuous and discrete processes, at times, where only two methods were of significance: the numerical solution of system governing differential equation (including experiments based on this equation solving), and organising and solving a time event scheduling mechanism correctly. Both methods were the only one for analysis of complex dynamic systems. Especially in case of very big continuous models also special hardware was of importance. Simulation software made programming of these methods easier.

Nowadays also other methods for analysing complex systems are coming up, e.g. the methods of soft computing, of symbolic analysis, and of chaos theory. These methods partly "co-operate" with the classical ones, partly they can replace them, and partly they are autonomous. Furthermore, classical simulation software has developed towards simulation environments (nowadays often called simulators). These environments would be able to support also the non-classical methods mentioned above. Consequently the working group has decided to concentrate on these new methods and to deal with features of simulators for supporting these new methods.

The first steps towards these new aims are:

- analysis of the methods of soft computing as methods for modelling and simulation
- testing the improvement of classical modelling and simulation by means of symbolic computation
- checking the features of simulators with respect to implementing or interfacing to these methods (within the ARGESIM comparisons)

It is also intended to change the name of the workgroup in order to meet the new aims better, a suggestion is "Simulation Tools and Simulation Methods".

The first steps towards these new aims were two meetings in December 1998, co-organised by the workgroup. On December 4, the workgroup ARGESIM hosted the ERUDIT Workshop "Applications of Fuzzy Logic" at TU Vienna, co-organised by ERUDIT and the Fuzzy Logic Laboratory of the Johannes Kepler University Linz. Prof. Zimmermann (RWTH Aachen), Prof. P. Klement (Univ. Linz) and Prof. F. Breitenecker welcomed about 35 participants to the following contributions:

Applications of Fuzzy Logic in Austria - Some Case Studies (P. Klement, Univ. Linz)
Forecasting Financial Markets (M. Kührer, Siemens AG Österreich, Wien)
Supervised Construction of Fuzzy Sets from Sample Data: Laboratory Test Results Describe Different Forms of Hepatitides (M. Schürz, Institut für Medizinische Computerwissenschaften, Wien
Soft Computing in Intelligent Multimodal Systems (B. Azvine, BT Networks and Systems, Ipswich, UK)
Using Simulation to Tune Knowledge Bases for Decision Support (J. Cuena, Technical University of Madrid)
Applications of Fuzzy Numbers in Statistics (R. Viertl, Technische Universität Wien)
Applications in Database Marketing (A. Pütz, MIT-Management Intelligenter Technologien GmbH, Aachen, Germany)
Fuzzy Clustering Methods for Land Cover Classification of Satellite Images
(G. Tutsch, Austrian Academy of Science, Wien)
Soft Computing Methods in Modelling and Simulation (F. Breitenecker, Technische Univ. Wien)

The meeting concluded with a very interesting discussion on applications of soft computing methods in "hard technical areas", esp. in "hard technical" modelling and simulation.

On December 3, ARGESIM and the working group organised the seminar "*Soft Computing in Modellbildung und Simulation, DataEngine, ECANSE, LabVIEW, MATLAB*" within the seminar series "*Seminare aus Modellbildung und Simulation*". 14 contributions discussed tools for soft computing in the above mentioned software tools and applications in some areas.

The next step towards the new aims is taking place at the work group meeting on March 1 - 2, 1999 at RWTH Aachen (organised together with work group FG5 "*Simulation Technischer Systeme*"). There the work group organises a special section on "Symbolic computation in modelling and simulation - application in technical systems". Furthermore, evaluations of the Software Comparisons are discussed, esp. the "fuzzy" comparison C9.

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

"Simulation und künstliche Intelligenz" (FG 3)

The next Workshop will take place at the Technical University of Chemnitz, April 12-13 , 1999. It will focus the target "Simulation based Optimization and Control of Discrete Systems". Please contact Prof. Peter Koechel for further information,
email: peter.koechel@ informatik.tu-chemnitz.de

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

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

The next Ebernburg Conference was decided to be held in April 2000. The working group has annual meetings and presentations during the ASIM Annual Simulation Conferences.

Speaker: Prof. Dr.-Ing. Dietmar P.F. Möller, University of Hamburg, Dept. Computer Science, Vogt-Kölln-Straße 30, D-22527 Hamburg, Fax: +49-40-5494 2206, email: moeller@informatik.uni-hamburg.de
Vice-speaker: Prof. Dr. Otto Richter, TU Braunschweig, Institut für Geographie und Geoökologie, Langer Kamp 19c, D-38106 Braunschweig, Tel: +49-531 391 5927, Fax: +49-531 391 8170, email: O.Richter@tu-bs.de

"Simulation technischer Systeme" (FG 5)

A report on the meeting on March 1st and 2nd, 1999, at RWTH Aachen will be given in the next issue.

Speaker: Ewald Hessel, Hella KG Hueck&Co., Abt. EL-R, Werk II, Beckumer Straße, D-59552 Lippstadt, Tel: +49-2941 38 8572, Fax: +49-2941 38 8427, email: hessel@hella.de
Vice-Speaker: Dr. Achim Wohnhaas, debis Systemhaus, Project Division, Fasanenweg 9, D-70771 Leinfelden-Echterdingen, Tel: +49-711 685 5626, Fax: +49-711 685 5710, email: awohnhaa@ debis.com

"Simulation in Produktion und Logistik" (FG 6)

The next event is the working group meeting on February 22th, 1999 in Kassel, Germany. Important topics are the speaker election, the organization of the 9th Working Group Conference, planned in spring 2000, and the publishing of a new book titled "*Referenzmodelle für Simulation in Produktion und Logistik*".

The 9th Working Group Conference will be held on March 8 - 9, 2000 in Berlin, Germany. It will be again organized by Dipl.-Phys. Markus Rabe, Fraunhofer Institute for Production Systems and Design Technology (IPK), Pascalstr. 8-9, D-10587 Berlin, Fax: +49-30-39 32 503, email: Markus.Rabe@ipk.fhg.de.

For detailed information about working group activities please refer to http://www.asim-pl.uni-kassel.de or contact Dr.-Ing. S. Wenzel, email: wenzel@ iml.fhg.de

Speaker: Prof. Dr.-Ing. A. Kuhn, Fraunhofer-Institut für Materialfluß und Logistik, Joseph-von-Fraunhofer-Straße 2-4, D-44227 Dortmund, Tel: +49-231 9743 132, Fax: +49-231 9743 234
Vice-speaker: Prof.Dipl.Ing. Adolf Reinhardt, Universität Gesamthochschule Kassel, Fachbereich 15, IPL, Kurt-Wolters-Str. 3, D-34125 Kassel, Tel.: +49-561 804 2693, Fax: +49-561 804 2697, email: fps@hrz.uni-kassel.de

"Simulation in der Betriebswirtschaft" (FG 7)

Speaker: Prof. Dr. W. Hummeltenberg, University of Hamburg, Institute for Computer Science in Business Administration,

Max-Brauer-Allee 60, D-22765 Hamburg. Tel.: +49-40-4123-40 23, Fax: +49-40-4123-64 41, email: wi@mba.uni-hamburg.de
Vice-speaker: Prof. Dr. Biethahn, Georg-August-University of Göttingen, Platz der Göttinger Sieben 5, D-37073 Göttingen.

"Simulation von Verkehrssystemen" (FG 8)

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

"Simulation in Umweltanwendungen" (FG 9)

For detailed information see the WWW pages of the working group: http://www.informatik.uni-rostock.de/FB/Praktik/Mosi/FG/ or contact the speakers.

Speaker: Prof.Dr.habil. Rolf Grützner, University of Rostock, Dept. of Computer Science, WG Modeling and Simulation, Albert-Einstein-Str.21, D-18059 Rostock, Tel: +49-381 4983369, Fax: +49 381 4983426, email: gruet@informatik.uni-rostock.de
Vice-Speakers: Dr. Hubert B. Keller, Research Center Karlsruhe GmbH, Institute of Applied Informatics, P.O. 3640, D-76021 Karlsruhe, Tel.:+ 49 7247 825756, Fax.: + 49-7247 825730, email: keller@iai.fzk.de
Dr. Jochen Wittmann, University of Rostock, Dept. of Computer Science, Chair: Modelling and Simulation, Albert-Einstein-Str. 21, D-18059 Rostock, Tel.: +49-381 4983368, Fax.: +49-381 4983426, email: wittmann@informatik.uni-rostock.de

I. Bausch-Gall, F. Breitenecker, I. Husinsky

CROSSIM

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

Membership

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

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Activities during 1998

- Co-organizing the 20th International Conference *"Information Technology Interfaces" ITI '98,* held in Pula, Croatia, from June 16-19, 1998. The conference has traditionally a strong modelling and simulation session.
- Co-organizing the 7th International Conference on *Operational Research KOI'98* held in Rovinj, Croatia, from September 30 - October 2, 1998.
- The society participated in the Biennial Conference of the International Society for Ecological Modelling (ISEM) with three papers and organization of a Workshop. Our representative Prof. T. Legovic has been elected as a vice-president of ISEM and CEO of the European Chapter.
- Regularly organizing a simulation seminar held at the Faculty of Economics, University of Zagreb. During 1998 the following seminars were held: Bozikov J., Modelling cancerogenesis; Benic D., Management of production by artificial intelligence; Legovic T., Ecological modelling Internet resources; J. Sohinger, General equilibrium models.
- Work on scientific projects in discrete and continuous simulation, and applications of simulation in such diverse fields as engineering, economy, medicine, ecology etc.
- Publication of papers in international and domestic journals and conference proceedings.
- Preparing the publication of a booklet about the CROSSIM society.
- The first WWW site in Croatian devoted to simulation was developed at the Faculty of Electrical Engineering and Computing. Its address is: http:// www.rasip.fer.hr/nastava/mis/.
- Initial WWW site of the society is: http://rudjer.irb.hr/~crossim/
- The CROSSIM e-mail distribution list at the Computing Centre of the Univ. of Zagreb serves as a communication medium among members. To subscribe please send to LISTPROC@CARNET.HR a line of text (leave an empty subject line) SUBSCRIBE CROSSIM *your name* and *surname*. To send e-mail to all members at once just send an e-mail to:CROSSIM@CARNET.HR

Activities during 1999

- Co-organizing a conference on "Models in science, technology and society" Zagreb, February 25, 1999.
- Co-organizing the 21th International Conference *"Information Technology Interfaces" ITI '99,* Pula, Croatia, from June 15-18, 1999.
- Co-organizing the Second European Ecological Modelling Conference, Pula, Croatia, September 20-24, 1999.

V. Bosilj Vuksic

CSSS

General Information

CSSS (The Czech and Slovak Simulation Society) has about 80 members in 2 groups connected to the Czech and Slovak national scientific and technical societies. The main objectives of the society are: development of education and training in the field of modelling and simulation, organising professional workshops and conferences, disseminating information to its members about modelling and simulation activities in Europe, informing the members about publishing in the field of modelling and simulation. Since 1992 CSSS is a full member of EUROSIM.

Past Events

The 20th International Workshop on "**Advanced Simulation of Systems (ASIS'98)**" was successfully held on September 15-17, 1998 in the Moravian town Krnov, Czech republic. 70 participants from the Czech and Slovak republics and 20 participants from Poland and Romania attended the workshop. During the workshop the annual meeting of CSSS was held as well as the 60th Anniversary celebration of Dr. Jan Stefan, chairman of CSSS.

The 13th International Conference on "**Process Control and Simulation**", (**ASRTP'98**) was held on September 8-11, 1998 in Tatranske Matliare, High Tatra's, Slovak republic. 62 participants from the Czech and Slovak republics and 80 participants from Poland, Austria, Turkey, Kazachstan, Jugoslavia and Ukraine attended the conference.. The chairperson of the International program committee was Prof. D. Malindzak, Technical University of Kosice.

The scientific conference with international participation "**Electronic Computers and Informatics'98**" was held October 8-9, 1998 in Herlany, Slovak republic. 60 participants from the Czech and Slovak republics, Poland and Romania attended the workshop and 40 papers were presented. General chair of the conference was Prof Milan Jelsina Technical University Kosice, Slovak republic.

Coming Events

The 33rd International Conference on "**Modelling and Simulation of Systems**" (**MOSIS'99**) will take place on **April 27-29, 1999**, in Roznov pod Radhostem, Czech republic. The chairman of the international program committee is Dr. Ing. Jan Stefan. Main topics: Visualisation, Virtual Reality and Simulation; Neural Nets, Fuzzy Logic, Evolutionary Algorithms and Simulation; Simulation Tools, Software; Simulation and Control Systems; Real Time Simulation, Network Simulation; Knowledge-Based Simulation; Decision Support Systems and Simulation; Case Studies.

The Conference is connected with two Workshops:

Workshop **ISM'99** - Modelling of Information System (Database Theory and Design, Text and Multimedia Databases, Formal Definition of Information System Models, Web-Based Information Technologies, Geographic Information Systems, Information Quality, Privacy and Security, etc.)

Workshop **MANAM'99** - Modelling in Manager Work: (Model Thinking in Management, Practice of Manager Modelling, Modelling in Education, Training and Coaching, Case Studies).

International Symposium "**Railways on the edge of third millennium**"(**ZEL '99**) will take place in Zilina, Slovak republic on **May 27-28, 1999**. On of the interesting topics is "Modelling and Simulation for Planning and Process Supervision on Railways". The chairman of the international organising committee is Prof. L. Skyva, University of Zilina.

The 21st International Workshop "**Advanced of Simulation Systems**" (**ASIS'99**) will take place in the Moravian town Krnov, Czech republic on **September 14-16, 1999**. The chairman of the international organising committee is Dr. Ing. Jan Stefan. Main topics: Modelling and Simulation in Education; Simulation Tools; Parallel and Distributed Simulation; Simulation in Hydrodynamics; Simulation in Ergonomic; New Modelling Paradigms.

The 3rd International Workshop "**Modelling and Simulation in Management Informatics and Control**" (**MOSMIC'99**) will take place in Zilina-Sulov, Slovak republic on **October 5-7, 1999**. The chairman of the international program committee is Prof. Mikulas Alexik. Main topics: Management Process Modelling and Simulation; Modelling and Simulation of Communications Processes (Traffic, Transport, Telecommunications); Simulation of Control Systems; Hybrid Technics of Simulations; Information Systems Modelling.

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M. Alexik

DBSS

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 the other members and is affiliated with SCS International and IMACS.

DBSS Membership

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

The contribution is divided in two options:

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

II. Dfl. 150,- individual member or Dfl. 250,- institutional member, which means that you will receive the Journal Simulation Practice and Theory eight times a year, and the newsletter Simulation News Europe three times a year. Becoming member of DBSS includes automatically being member of EUROSIM, the overall organisation of European Simulation Societies. DBSS members enjoy reduction of the fees attending the "EUROSIM events" which include congresses, conferences, symposia, workshops etc.

For institutional members counts that they can join national "DBSS events" with three persons against the reduced fee.

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

Dutch Benelux Simulation Society
Mrs. Marja Dekker-Genemans
Noordeindseweg 61
2651 LE Berkel en Rodenrijs, The Netherlands
Tel: + 31-10 51 12714
Fax: +31-10 51 13883
Email: L.Dekker@pa.twi.tudelft.nl

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

The Steering Committee consists of the following members:

A.W. Heemink (TU Delft)	Chairman
L. Dekker	Vice-Chairman
J.C. Zuidervaart (TU Delft)	Treasurer
M.J. Dekker-Genemans	Secretary
W. Smit (AKZO NOBEL)	Member
Th.L. van Stijn (Rijkswaterstaat/RIKZ)	Member

Past Events

On November 6, 1998 a symposium, in cooperation with HPAC (High Performance Applied Computing Centre) in Delft has taken place about the theme "**visualisation**". During this symposium HPAC has officially inaugurated its virtual workbench. The chairmen of this workshop were prof.dr. F.T.M. Nieuwstadt and prof.dr. S.W. dé Leeuw. Six presentations were given a.o.: – Immersive telepresence in responsive virtual environments – Computational steering – Visualization from desktop to the responsive workbench – High-Performance visualization with the virtual workbench.

Symposium Neural Networks in Water Resources: On Tuesday, January 19, 1999, DBSS has organized in cooperation with Technotrans, Rotterdam and The Delft University of Technology, a symposium on the application of Neural Networks in Water Resources. Approximately 70 researchers from many different institutes did attend the symposium. The chairman of the workshop was prof. dr. P. van der Veer of the Faculty of Civil Engineering. After an introductionary presentation on the theory of Neural Networks eight presentations were given that cover many different practical aspects of the application of Neural Networks to problems in water resources. The applications varied from – waste water purification – water management problems – control of water networks – data validation and correction – tidal prediction problems – river flood prediction – current prediction for shipping guidance – sediment transport problems There were many fruitful discussions after the presentations. The workshop was very successful and it is the intention to organize a follow up workshop in the future.

Coming events

Tuesday April 13, 1999, under the auspices of the DBSS the following workshop will be organised "**Simulation of business economical models**". The workshop will take place at the Erasmus University Rotterdam. The final program will be mailed to the members of DBSS. For more information please contact: H. de Swaan Arons, Tel: + 31-10 4081813, email: deswaanarons@few.eur.nl

General Meeting DBSS. After this workshop, at 16.00 hours, the General Meeting of the DBSS will take place. An agenda and the underlying documents for this meeting will be mailed to the members in the first half of March.

Symposium Ethical Issues in Modeling and Simulation, July 2, 1999. As a tribute to professor Maurice Elzas the Computer Science Group of the Wageningen University will organize a one day symposium with the theme "Ethical Issues in Modeling and Simulation". This symposium will be organized at the occasion of the celebration of the 65th birthday of Maurice Elzas. The preliminary program includes presentations of prof.dr. T.I. Ören (University of Ottawa, Canada), prof.dr. F. Pichler (University of Linz, Austria) and prof.dr. B.P. Zeigler (University of Arizona, USA). During the symposium there will be time for informal discussion with all participants. The symposium will be held at the Conferentieoord "De Wageningse Berg", Generaal Foulkesweg 96, Wageningen, The Netherlands. There is no attendance fee for the symposium, except for the lunch, appr. dfl. 30,-. The number of attendees will be limited, so registration is needed.
Registration and further information:
dr. D.L. Kettenis
Computer Science Group
Dreijenplein 2
6703 HB Wageningen, The Netherlands
Phone: + 31- 317 483773
email: Dik.Kettenis@Users.Info.Wau.nl

Since 1964 Maurice Elzas is active in the simulation field. He has been active in simulation methodology as well as application of modeling and simulation. Furthermore, he has been active in hardware and software development. For example, during the sixties and seventies he has been one of the main designers of an analog computer and the hybrid simulation language HL1. Maurice Elzas has also contributed to the Knowledge Based Systems field. In this and the simulation methodology field he has cooperated closely with Bernard Zeigler and Tuncer Ören This cooperation resulted in four congresses with a great impact in the simulation and artificial intelligence field and four books has been published edited by the mentioned persons.

The research of Maurice in the Knowledge Based Systems field has resulted in the simulation environment Conceptual Modeller 100. This was one of the first, if not the first, simulation environment supporting the user in structuring and decomposing the subject under study and in system simplification and lumping. Maurice Elzas has been successful in Industry and Academia. Since 1970 he was chairman of the Computer Science Department of the Wageningen University, The Netherlands. He has served the national and international simulation community in several positions, for example IMACS (formerly AICA) and SCS. He has been active in organizing congresses of both organizations. Apart from that he has been actively involved in the Computer Science arena as, a.o. chairman of CEPIS, the Council of European Professional Informatics Societies.

Triennial EUROSIM congress in 2001: working title: SHAPING FUTURE WITH SIMULATION, see page 12.

Marja Dekker-Genemans

FRANCOSIM

FRANCOSIM was created in 1991 and aims to the promotion of simulation and research, in industry and academic fields. It has members from large French companies and members of Belgian and French universities.

FRANCOSIM operates two poles:
- Modelling & simulation of continuous systems
- Modelling & simulation of discrete events systems

Modelling & simulation of discrete events systems

A large community of researchers interested in discrete event simulation exists in France. Application areas are varied and include: hospitals, harbours, transportation systems, computers and industrial systems. Manufacturing systems are probably the main area of interest of FRANCOSIM members from the discrete side. Simulation is used and studied both by academic institutions and by industrial companies.

To improve the necessary synergy between industrial and academic people in the area of system modelling, the series of conferences "MOSIM" (Modelling and simulation) has been initiated after the success of a first conference on modelling and simulation in production management in Clermont Ferrand (with the support of the French CNRS through the GDR auto- matique). MOSIM is scheduled every 2 years.

FRANCOSIM, and its international partner societies of EUROSIM, represent a good framework for new initiatives and for members to go further.

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email pierreva@ifma.fr

Modelling & simulation of continuous systems

This pole has been working for several years and has already organised 3 workshops (2AO92, 2AO94, 2AO96) which grouped industrials and academics in the field of modelling and simulation of continuous systems. It has also produced a document for the evaluation of modelling and simulation software which was published in the EUROSIM 1995 Congress in Vienna. The pole is presently reorienting its work towards the organisation of one-day workshops on specific subjects. It is also currently organising a one-day workshop on diagnostics and fault detection. It will run in April the BioMedSim'99 conference described below.

BioMedSim'99
1st Conference on Modelling an Simulation in Biology, Medicine and Biomedical Engineering
20-22 April 1999, ESIEE Noisy-le-Grand, France

BioMedSim'99 is the first of a series of conferences to be held once every 2 years. These conferences are intended to be an opportunity for researchers and industrials to present fundamental work and applications in fields related to the modelling and simulation in living systems.

As both biological and mathematical aspects are involved the organisers expect that this series of conferences will offer researchers and developers in both fields an opportunity to meet, exchange information and establish contact.

For more information on this workshop, please consult the following address:

http://www.esiee.fr/~hamamy/bioconf.html

Pole and Conference contact :
Prof. Y.Hamam
Groupe ESIEE
Cité Descartes, BP 99
2 Bd. Blaise Pascal
F-93162 Noisy le Grand CEDEX, FRANCE
Fax: +33-1-45 92 66 99
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Fax: +32 4 367.83.00
email: lorsim@lorsim.be

Y. Hamam

HSS

General Information

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

Activities

We are co-operating in the organization of several international simulation conferences as the 4th Beijing International Conference on System Simulation and Scientific Computing, Beijing, P.R. of China; European Simulation Multiconference, Warsaw, Poland; 21st International Conference on Information Technology Interfaces, Pula, Croatia; Modelling and Simulation of Systems (MOSIS'99), Roznov pod Radhostem, Czech Republic.

Beyond these we are also involved in the organization of the Summer Computer Simulation Conference, Chicago, Illinois, July 11-15, 1999. Within this conference Prof. Javor is the chairman of the track KBS and AI. Although the official deadline for submitting abstracts is over, those colleagues intending to submit contributions for this track may contact him urgently.

We would like to call the attention of our friends and colleagues that the postal address has been slightly changed again as given below. In case of postal correspondence please use the complete address to ensure the proper arrival of your letter.

Contact Address

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A. Jávor

ISCS

General Information

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

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

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

Membership

At present ISCS counts 129 members: 13 institutional, 4 honorary, 110 regular and 2 affiliate.

Charges per annum are Lit. 30,000 for regular and affiliated members and Lit. 400,000 for institutional members.

Contact Address

For further information or application for membership, please contact:

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

Activities

The steering committee of ISCS is presently involved in the organization of **ISCS'99**, the annual conference whose date and place will be fixed in the next few weeks.

Topics of interest for the conference are methodological and application aspects of simulation. They include:

Simulation tools and applications
Simulation and object oriented programming
Simulation in software engineering
Simulation theory and methodologies
Simulation graphics
Simulation in computer systems and networks
Simulation in electronics and control
Simulation in electrical engineering and energy systems
Simulation in multimedia systems
Simulation and virtual reality
Simulation in education and training
Simulation in business and management
Simulation in transportation, traffic systems and telecommunication
Parallel and distributed simulation
Simulation in factory and automation
Simulation in environmental and biological systems
Simulation in medicine
Artificial intelligence and simulation

Notice to ISCS members:

The annual meeting of ISCS members is scheduled to be held on the occasion of the ISCS'99 Conference.

We recall that an electronic mailing list has been constituted for persons interested in the ISCS activities. In order to be included in such list, it suffices to send an email message (Subject: ISCS mailing list) containing name, affiliation and address (surface and electronic) to the following address: cortelle@ info.uniroma2.it. To spread information to Italian simulation community, you are invited to send email messages to cortelle@info.uniroma2.it and they will be forwarded to all the addresses of the mailing list.

V. Cortellessa

PSCS

General Information

PSCS (The Polish Society for Computer Simulation) was founded in 1993 in Warsaw. PSCS is a scientific, non-profit association of members from universities, research institutes and industry in Poland with common interests in variety of methods of computer simulations and its applications. At present PSCS counts 193 members. The affairs of the PSCS are directed by the board of second cadence consisting of the following persons:

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

Activity

The main activity of the Polish Society for Computer Simulation are annual conferences known as "PSCS Workshops on Simulation in Research and Development". The third PSCS Workshop was organised in 1996 by Prof. Leon Bobrowski in Wigry and there were about 80 participants. The fourth PSCS Workshop was organised in 1997 by Prof. E. Kolodzinski in Jelenia Gora.

Past Events

The annual PSCS Workshop on Simulation in Research and Development took place on October 7-9, 1998 in Jelenia Gora, Poland. The about 70 participants came from Germany, Japan, the USA, and Poland. The 50 papers of the workshop covered the following areas: simulation in mechanical engineering, simulation in mathematical problems, artificial intelligence and simulation, simulation in transportation, neural nets and simulation, simulation in automation and control, military simulation, simulation tools.

Publications

Proceedings of the Fourth PSCS Workshop on "Simulation in Research and Develpment", R.Bogacz and E. Kolodzinski (Eds.), Warsaw, 1998, ISBN 83-902146-2-8, (in Polish). The price is 20,- PLN.

Coming Events

The sixth PSCS Workshop on Simulation in Research and Development will be organised in Bialystok and Bialowieza on 25-27 August 1999 by Prof. L. Bobrowski: e-mail: ptsk99@ii.pb.bialystok.pl

PSCS will participate in organisation of the European Simulation Multiconference **ESM'99** which will be held in Warsaw on June 1-4, 1999.

Contact persons:
Prof. Helena Szczerbicka
esm99@informatik.uni-bremen.de
Prof. Philippe Geril, philippe.geril@rug.ac.be
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Z. Sosnowski

SIMS

General information

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

SIMS99 Conference

The 1999 annual meeting of SIMS will be arranged in the surroundings of Linköping in Sweden by Prof. Peter Fritzon from Linköping University. For more information visit the Internet address http://www.ida.liu.se/~pelab/SIMS99

How to join SIMS

You may register as a member of SIMS by sending your application with your personalia to the address: sims@vtt.fi

SIMS' members will receive information on simulation conferences, courses and other related events. SIMS' members will get discounted fees on conferences arranged by SIMS, EUROSIM or SCS, and subscriptions at discounted prices on the news journal *Simulation News Europe* and the scientific journal *Simulation Practice and Theory*.

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SLOSIM

General information

SLOSIM (Slovenian Society for Modelling and Simulation) was established in 1994 and became a full member of EUROSIM in 1996. It has 87 members from both Slovenian universities, institutes and industry as well and aims the promotion of modelling and simulation in industrial and academic environments and to facilitate communication among corresponding groups.

Contact Address

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slosim@fe.uni-lj.si

News

On November 25, 1998 the general and election meeting of our society was held at the Faculty of Electrical Engineering. The following subjects were discussed:

Activities in the period 1994-1998

Our representative participated at all EUROSIM board meetings (Vienna, Delft, Keswick, Helsinki). SLOSIM activities are regularly presented in each issue of *Simulation News Europe*. Each member subscribed SNE, ten members subscribed *Simulation Practice and Theor*y. The subscription for SNE and SIMPRA was paid by the Ministry for Education and Sport as the membership fee of our society in EUROSIM. Therefore I owe the ministry a deep debt of gratitude.

The main important activities in the past four years were tightly connected with presentations of Slovenian groups dealing also with modelling and simulation. Seven groups from Universities of Ljubljana and Maribor presented activities on the following areas: control engineering, experimental mechanics, numerical modelling and simulation, computer graphics, robotics, biomedicine and biocybernetics, process technology in chemical engineering, liquid and solid materials dynamics, electrical machines and drives, control in electroenergetics , decision making in organizational sciences etc.

Beside presentations SLOSIM was active in preparation of the traditional annual Electrotechnical and computer conferences in Portoroz where each year at least two sections from the area of modelling and simulation were organized.

Several invited lectures were also organized in the past. The last one which was given by prof. Tomaz Maher from Faculty of Civil and Geodetic Engineering, Traffic Technical Institute dealt with modelling and simulation as an efficient approach in solving severe traffic problems in Ljubljana and its neighbourhood.

A new SLOSIM board has been elected for the period 1998-2002:

B. Zupancic	president
M. Kljajic	vice president
G. Mušic	secretary
M. Simcic	treasurer

The board consists of nine members from different institutions.

Currently SLOSIM has 87 members, mainly from universities and institutes, but also from industry. During the last year about ten members resigned from membership. However several new members affiliated to SLOSIM so that the number remained almost the same.

During SLOSIM general and election meeting prof. dr. France Bremšak, the beginner of Slovenian modelling and simulation activities, was nominated as the first honorary member. The explanation of this promotion is described below.

Events

The following activities are planned for 1999:

- presentations of two groups (Faculty of Pharmacy, Josef Stefan Institute, group for Computer Automation and Control),
- organisation of modelling and simulation track on ERK conference (Sept. 1999, Portoroz), etc.

Borut Zupancic

Nomination of prof. dr. France Bremšak for the first SLOSIM honorary member

The Slovenian Society for Simulation and Modelling (SLOSIM) on its fourth general and election meeting on November 25, 1998, nominated prof. dr. France Bremšak for its first honorary member.

Argumentation

Problem solving by the aid of modelling and simulation approach has an extremely long tradition at the Faculty of Electrical Engineering in Ljubljana. Moreover it can be stated that the beginnings of simulation in Slovenia followed the development of this discipline in the world surprisingly fast. On the other hand it is well known that the appearance of general-purpose analog computers represented the trigger for the

rapid progress of simulation. In this early phase of evolution prof. Bremšak forty years ago started with his work in the area. First in USA and later as the head of Electronic department on Nuclear institute "Josef Stefan". As such he was the leader of the group which developed and realized general purpose analog computer of reasonable capacity, what at that time, represented one of the earlier devices of its class even in the world. On the Faculty of Electrical Engineering he was the founder of the Laboratory for analog-hybrid computation and automatic control which was equipped with an analog-hybrid computer EAI-580 and later with a parallel processor EAI-2000 that initiated several new research and educational activities. He formed a successful research team which together with the corresponding group on the "Josef Stefan" Institute covered the area of modelling and simulation in control but also in some non-technical sciences.

Professor Bremšak was a tutor of a large number of students who successfully worked in different areas from science to industry at home and abroad. The same can be stated also for the current research and education staff of the Laboratory for modelling, simulation and control and Laboratory for industrial processes automation which draw the origin in the professor's laboratory as well as for the staff of the Department for Computer Control and Automation on the "Josef Stefan" Institute. Professor Bremšak carefully followed the trends in the area from the appearance to the decline of analog computers, from the early stage of digital simulation languages to the latest trends of modern object oriented modelling and simulation environments, real time systems, etc. However his main merit is perhaps the fact that he created the conditions which enabled the work of the teams which efficiently continued his efforts.

Prof. F. Bremšak (left), the first honorary member of SLOSIM, right: Prof. Karba

All who know professor Bremšak and his work as well as his outstanding human qualities agree that, concerning the mentioned facts, he can be proclaimed as the beginner and pioneer of simulation in Slovenia and as such the only person who can be nominated for the first honorary member of the Slovenian Society for Simulation and Modelling.

Prof. dr. R. Karba

UKSIM

General Information

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

Fourth United Kingdom Simulation Society Conference

The conference is almost upon us. The fourth UKSim conference will be held at St. Catherine's College Cambridge, England on April 7-9th April 1999. Founded in 1473, St. Catherine's College is beautifully located in the heart of Cambridge, surrounded by many other well-known colleges. Although a national event, presenters and participants from any country are welcome to attend, especially EUROSIM member countries.

For further information, please see the announcement in the UKSim web-site (address below) or contact the Programme Chair from whom further information is available.

Dr. David Al-Dabass
Department of Computing
Nottingham Trent University
Burton Street
Nottingham NG1 4BU
email: dad@doc.ntu.ac.uk

UKSim web-site

The UKSim web-site has been re-located. It can now be found at http://www.doc.ntu.ac.uk/uksim/. The site includes links to various simulation sites. If your site is not there – please email us. We also have some information about the society and useful information about the forthcoming UKSim conference.

Membership

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

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Gary J. Gray

SCS Europe

1. About SCS and SCS Europe

SCS is the international, multi-disciplinary forum dedicated to research, development, and applications of simulation. Since its founding in 1952, the Society for Computer Simulations membership roster has been made up of engineers, scientists, managers, business professionals, students, and educators. A very diverse field whose interests include: artificial intelligence, microcomputers in simulation, methodology and validation, supercomputers, and more. SCS International started a European Office at the University of Ghent in 1985 when Philippe Geril became the Office manager, at that time under the supervision of the office founders prof. Ghislain VanSteenkiste and prof. Eugene Kerckhoffs. In 1991 the SCS European Council was established (initiator and 1st chairman: Eugene Kerckhoffs, 2nd and current chairman: Dr. Alexander Verbraeck). In 1994 the SCS European Office was changed into SCS Europe BVBA (executive directors : Philippe Geril, Eugene Kerckhoffs and Rainer Rimane), which now is the organisational and financial body behind the SCS European Council. SCS Europe BVBA also includes the SCS European Publishing House (executive director in charge: Rainer Rimane).

SCS Europe BVBA organizes international scientific conferences on computer simulation and related fields. On a yearly basis, it takes care of the "European Simulation Multiconference" ESM, the "European Simulation Symposium" ESS, and two smaller conferences: the "European Concurrent Engineering Conference" (ECEC) and the "Scientific Conference on Web Technology, New Media, Communications and Telematics" Euromedia. SCS Europe BVBA is also involved in the organization of local workshops. It should be stressed that all these activities are in close cooperation with the SCS European Council. During each ESM and ESS the Council Board and also the Conference Board of the SCS European Council meet to discuss policies with respect to conferences. For many of our conferences both written Proceedings and CD-ROMs are available, which also can be ordered afterwards. The SCS European Office is still looking for people who are able and willing to present tutorials at our conferences, and/or to become fully fledged teachers for our future SCS Summer-schools. If you are interested, please get into contact with Philippe Geril (see coordinates below).

SCS Europe BVBA and the SCS European Council are happy to cooperate with other Simulation Societies in Europe. Recently, we have reached an agreement to cooperate with ASIM and ARGESIM in the common publication of books (see also point 4). *Simulation News Europe* is now the official news journal for European SCS members. SCS Europe BVBA has started discussions with DBSS in order to investigate the possibility of combining its yearly ESM conference with the triennial congress of EUROSIM, especially EUROSIM2001 organized by DBSS. So far fruitful discussions have taken place and are still going on. Some items have still to be discussed; for that reason an official written agreement between both parties has not been reached yet. SCS Europe BVBA expresses the sincere hope that an official agreement will be reached soon; this indeed would be very beneficial for the European simulation community.

2. Report on last previous SCS event(s)

In the recent foregoing period of time we have held ESS98 (the 10th European Simulation Symposium & Exhibition) in Nottingham, UK, October 26-28, 1998. This conference was a well-organized event, and we wish to thank the chairman prof. Andrzej Bargiela and his staff for the many efforts they have spent in order to make the conference the success it has been. The major topics were: Simulation Methodologies; Simulation in Chemistry; Engineering Systems Simulation; Simulation in Industry and Services; Simulation in Business and Finance; Simulation and Artificial Intelligence; moreover, a Human Centred Simulation track has been included. The conference has been attended by 157 participants. There were 10 exhibitors. The exhibition was nicely integrated in the conference which was appreciated very much by the participants. Also appreciated were the reception in the City Hall of Nottingham and the conference dinner in the Royal Albert Hall. The 766 pages proceedings "Simulation Technology: Science and Art" (eds. A. Bargiela, E.J.H. Kerckhoffs; ISBN 1-56555-147-8) contain all lectures presented at this conference.

3. Forthcoming SCS (or SCS-sponsored) scientific events

3.1 The First Middle East Workshop on Simulation and Modelling

Amman, Jordan, March 1-3, 1999 (hosted by the University of Jordan)

General Conference Chair: Dr. Marwan Al-Akaidi; General Program Chair: Prof. Issam Zabalawi; Program Chair: Dr. Alexander Verbraeck

The aim of this SCS workshop is to set up SCS activities and possibly finally an SCS Council in the Middle East and to encourage the use of simulation in this geographic area. The workshop features a technical program ranging from technical lectures to exhibits, meetings for professionals, and a social program. The Workshop topics are: Modelling and Simulation Methodology , Simulation of Networks and Communication Systems, Energy System Simulation, Fuzzy Systems Modelling, Adaptive Modelling and Simulation, Web Based Simulation, Simulation in Education and Training, Neural Network Applications and Modelling, Simulation in Weather Prediction Models, Modelling in Semiconductor Materials. At the moment of writing this we expect some 50-60 participants and a program of some 20 scientific lectures.

3.2 ECEC99 (6th European Concurrent Engineering Conference 1999)

Erlangen-Nuremberg, Germany, April 21-23, 1999 (hosted by the Friedrich Alexander University, sponsored by Daimler-Benz AG, Research and Technology, Stuttgart, Germany)

General Conference Chairman: Dr. Uwe Baake (Daimler-Benz AG, Research & Technology) Program Chairman: Dr. Richard Zobel (University of Manchester)

The conference aim of ECEC99 is to provide European Researchers with a forum, where they can discuss the latest developments linked to Concurrent Engineering. ECEC99 aims to identify the progress that has been made in CE over the last year. It helps the dissemination of information and exploitation of results from research and technical developments and provides a forum for the exchange of experiences in developing and implementing CE-based solutions across a wide spectrum of manufacturing and engineering industries. The conference is target at industrial enterprises, industrial associations, universities and research institutes. Major topics are: Organization and Management; Formal Methods and Techniques; Implementation Techniques; Process Modeling; Engineering Data Management and Information Modeling; Engineering Process; Networking and Distribution in CE; Management; Collaborative CE Environments and Virtual Design Studies; Practical Applications and Experiences. We have received over 60 paper proposals which are currently in the reviewing process.

3.3 EUROMEDIA99 (Fourth Annual Scientific Conference on Web Technology, New Media, Communications and Telematics: Theory, Methods, Tools and Applications)

Munich, Germany, April 25-28, 1999

General Conference Chair: Prof. Winfried Hahn (University of Passau) General Program Chair: Dr. Ellen Walther-Klaus (Siemens Nixdorf Informationssysteme AG, Munich) Vice Program Chair: Prof. Jan Knop (University of Düsseldorf)

The 1999 SCS EuroMedia conference will bring together three individual subconferences (WEBTEC, MEDIATEC and COMTEC) culminating in a fourth one: an applications subconference (APTEC) on the last conference day. EuroMedia is a scientific event, and focuses on the exchange of new technology, methods, tools, and applications in the wide field of multimedia Information and Communications Technology (ICT). Rather than just showing new tools, the focus is on scientific presentations, based on refereed papers with adequate underlying theory and if possible empirical testing of results. The fields covered at this conference include Web technology, multimedia, telecommunications, mobile computing, broadband networking, distributed computing, and telematics. The papers will cover the following subjects: WEB Technology (WEBTEC), Multimedia Technology (MEDIATEC), Telecommunications Technology (COMTEC), Applications of Telematics (APTEC). At the moment of writing this, 50 paper proposals have been accepted by the conference scientific committee.

3.4 ESM99 (13th European Simulation Multiconference; Modeling & Simulation: a Tool for the next Millennium)

Warsaw, Poland, June 1-4, 1999s

Co-sponsored by the Polish Society of Computer Simulation, assisted by the IEEE Computer Society Poland; hosted by IBIB PAN, Institute of Biocybernetics and Biomedical Engineering and ICM, Interdisciplinary Centre for Mathematical and Computational Modelling, University of Warsaw, Poland.

General Chair : Prof. Helena Szczerbicka (University of Bremen, Germany) Program Chair: Prof. Marek Niezgodka (ICM, Warsaw University Poland) Local Chair: Prof. Leon Bobrowski (IBIB PAN, Bialystok University of Technology, Poland).

The ESM99 is an international conference concerned with state of the art technology in modeling and simulation. For several years, ESM has proven to be a forum for researchers involved in building innovative simulation systems, simulation and modeling tools and applications on both the research and industrial front. The conference includes exhibits, business meetings for professional societies, software user groups, and a social program. The scientific program includes tracks on Simulation Methodology, Simulation Languages and Tools, Simulation Validation Methodologies, Web Based Simulation, Simulation and Education, Applications of Simulation (such as: Telecommunication; Biomedicine; Modeling of Manufacturing Processes, Scheduling; Modeling in Engineering Processes; Air Transportation and Aerospace; Decision Processes in Management; Electrical Power Plants; Industrial Applications). In addition to the above, there will be two workshops included:

- International Conference on Qualitative Information, Fuzzy Techniques and Neural Networks in Simulation (General Chair: Prof. Francois Cellier, University of Arizona, USA; Program Chair: Dr. Josep Aguilar Martin, LAAS, Universita de Girona, Spain), and
- NGHSN99: Workshop on Modeling Multimedia Support in Next Generation High Speed Network (organized by Dr. Hermann de Meer, Columbia University, USA, and Dr. Stefan Fischer, International University, Germany).

Submissions can still be sent in electronic form, indicating the type of submission (full paper or extended abstract), to both the General Chair (esm99@informatik.uni-bremen.de) and to the SCS Europe BVBA (philippe.geril@rug.ac.be). At the moment of writing this we have received over 200 paper proposals or extended abstracts; they are currently in the reviewing process.

3.5 International Workshop on "Advanced Simulation (including visualization and animation) and AI, Supporting Production Process Development in the Factory of the Future".

Bucharest, Romania, 29-31 August 1999 (hosted by the Bucharest Research Institute for Informatics).

General Chair: Prof. Florin-Gheorghe Filip (Research Institute for Informatics, Bucharest, Romania) General Co-chair: Prof. Ghislain Vansteenkiste (University of Ghent, Belgium). Program Chair: Carmen-Veronica Bobeanu (Research Institute for Informatics, Bucharest, Romania) Program Co-chair: Prof. Eugene Kerckhoffs (Delft University of Technology, the Netherlands).

The Workshop intends to contribute to the dissemination of scientific and technological results of using advanced modelling and simulation as well as AI-techniques in industrial design and manufacturing. Three different tracks are planned to cover recent progress in modelling enterprises, production process planning and control, and simulation and AI in the factory of the future, encompassing methodological approaches, methods, tools and applications. Full papers or extended abstracts, in electronic format, are to be submitted to Philippe Geril (see address below) before March 5th, 1999.

3.6 HMS-1999: the International Workshop on Harbour, Maritime & Logistics Modelling and Simulation

Genoa - Italy, September 16 - 18, 1999

General Chairs: Agostino G. Bruzzone, University of Genoa, Italy Roberto Mosca, University of Genoa Program Chairs: Yuri Merkuryev, Riga Technical University, Latvia Pietro Giribone, University of Genoa

The Workshop concentrates on applications of simulation and computer technologies to maritime environment, transportation and logistics; this workshop was already included in Simulation in Industry Conference, Genoa, 1996 and last year was organized in Riga (Latvia). In 1999 HMS will be held in Genoa, one of the major harbours in Europe, located in the middle of the Italian Riviera, just 20 minutes drive from Portofino. Extended abstracts (2-3 pages for papers typewritten) or draft full papers are due to arrive in Text/ASCII or HTML format by email to liophant@itim.unige.it (deadline April 1, 1999).

3.7 ESS99: the 11th European Simulation Symposium and Exhibition / Simulation in Industry

Erlangen-Nuremberg, Germany , October 24-27, 1999 (hosted by the Friedrich-Alexander University)

Conference Chair: Prof. Dietmar P.F. Möller (University of Hamburg) Conference Co-chair: Prof. Graham Horton (University of Erlangen-Nuremberg) Program Chair: Prof. Ulrich Ruede (University of Erlangen-Nuremberg) Program Co-chair: Dr. Karin Reger

The topics of this conference are: Methodology and Tools, Logistics, Telecommunications, Virtual Reality, Analytical and Numerical Modelling Techniques, Simulation in Industry / Economics, and High Performance Simulation. Deadline of paper proposal submission: May 5, 1999.

Of course, in the above we were only able to provide global information of the mentioned scientific SCS events. For more detailed information, please contact:

Philippe Geril
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University of Ghent
Coupure Links 653, B-9000 Ghent, Belgium
Phone: +32.9.233 77 90; Fax: +32.9.223 49 41
email: philippe.geril@rug.ac.be

or have a look to our Website:

http://hobbes.rug.ac.be/~scs

4. SCS European Publishing House

As a part of SCS Europe BVBA, the SCS European Publishing House publishes high-quality scientific books on computer simulation and related fields. In the framework of an agreement between SCS and ASIM it is decided to publish from now on our books in the series "Advances in Simulation" and "Frontiers in Simulation" together, i.e. as products of the European Publishing House & Argesim; the chief editors of both series are: Prof. Felix Breitenecker, Prof. Gerald Kampe, Prof. Eugene J.H. Kerckhoffs, Prof. Axel Lehmann, Prof. Dietmar P.F. Moeller, Prof. Henri Pierreval, and Dr. Richard Zobel. In the series "Frontiers in Simulation" the following books have appeared:

- Yussef Monsef: Modelling and Simulation of Complex Systems Methods, Techniques and Tools;
- W. Krug: *Intelligentes Simulations und Optimierungssystem für Prozesse der Fertigung, Organisation und Logistik: ARENA / ISSOP* (in German)

- Axel Hein: Conjoint Simulation - A Modeling Framework for Combined Performance and Dependability Analysis of Computer Systems
- Peter Heusser: Modelling and Simulation of Boiling Channels - General Front Tracking Approach
- Karin Reger: *Konzeption und Realisierung der Konfigurierbarkeit universeller Simulationssysteme* (in German)
- Thomas Apsel: *Konzeption des Aufbaus eines universell einsetzbaren Simulationssystems* (in German)
- Christian Kelling: *Simulationsverfahren für zeiterweiterte Petri-Netze* (in German)
- Nicole J. Saam: *Computergestützte Theoriekonstruktion in den Sozialwissenschaften* (in German)
- Markus Rümekasten: *Hybride, tolerante Synchronisation für die verteilte und parallele Simulation gekoppelter Rechnernetze* (in German), and recently:
- Lode K.J.M. Vermeersch: Neural structure characterisation of ill-defined systems.

In the last-mentioned book an overview is given on relationship detection, structure characterisation and parameter estimation, and the possible role that neural networks could play in these different phases of the inductive modelling of ill-defined systems. As a testcase for especially neural structure characterisation, a (simplified) wastewater characterisation to recognize wastewater pollutants is dealt with.

For more information or to order books, please contact:

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University of Erlangen-Nuremberg
Institute of Mathematics IV
Martensstrasse 1 D-91058 Erlangen, Germany
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email: rimane@informatik.uni-erlangen.de

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

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

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

International Societies

SIGSIM

General Information

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

Regular Activities

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

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

Special Activities

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

Contact Addresses

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Membership

SIGSIM has approximately 700 members distributed among 50 countries around the world. Annual membership fees are $45, or $22 when accompanied by membership in ACM. Members receive registration discounts on SIGSIM sponsored conferences, access to members-only service on the Web page, CD-ROM version of the Proceedings of the Winter Simulation Conference, and paper Proceedings of the Parallel and Distributed Simulation Workshop. Additional membership information is available from:

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108 Cowley Road
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http://www.acm.org/sigsim/

Roger Smith

The Chinese Association for System Simulation (CASS)

The Chinese Association for System Simulation (CASS) is subordinate to the Chinese Science and Technology Association. CASS was founded in February 1989 and convened the first council simultaneously. During the first council, a series of subcommittees was founded, including various specialized committees, working committees, offices and local simulation associations. Next CASS carried out a series of domestic and international academic exchanges. Experts confined together the connotation of the discipline of system simulation and confirmed a special base theory, "similar theory" in system simulation and the directions of the branches of system simulation. The second nationwide representative assembly of CASS was carried out in1993 by letter. During the assembly, the staff of the second council was elected. According to the development of the situation, the second council considered more deeply the developments towards depth field, advanced technology, synthesis

system, simulation of whole life circle, paralleled system, visual reality, etc. and the tendency towards popularization and application, technology spread, and more extensive international academic exchanges.

CASS conducted the election of the third council in1997. The present organization is as follows: President: Wang Xingren (Beijing Univ. of Aero. & Astro.,) Vice president: Wang Zicai, Wang Zhengzhong, Sun Guoji, Li Bohu, Cheng Huaijin (General Company of The Astronautics Industry), Zhang Minglian, Huang Keli, Xiong Guangleng, General Secretary: Zhang Minglian Beijing (Univ. of Aero. & Astro.).

CASS consists of seven specialized committees, two working committees, and five local simulation associations. That is: Special committee on system simulation technology application; Special committee on simulator; Special committee on control system simulation and computer aided design; Special committee on simulation algorithm; Special committee on simulation methodology and modeling; Special committee on simulation computer and software; Special committee on aeronautics and astronautics system simulation; Special committee on association organization working committee; Special committee on education and science popularization;

CASS has done its best to promote domestic academic exchanges. CASS periodically conducts discipline research conferences and academic annual meetings. All these academic activities contribute to the development of our country's system simulation technology.

On the other hand, CASS enthusiastically develops international academic exchanges. CASS has successfully conducted the Beijing International Conference on System Simulation and Science Computing (BICSC) for three times. Many experts from more than 20 countries attended these conferences. The conferences promoted the communication and cooperation of the experts and scholars from the different countries in the field of simulation. The **fourth Beijing International Conference on System Simulation** and Science Computing will take place on **October 19-21, 1999**, http://ns.dept3.buaa.edu.cn/bicsc/bicsc99.htm

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EUSFLAT

European Society for Fuzzy Logic and Technology

EUSFLAT is a new non-profit European Society with the following aims:

- To promote and disseminate the methods, techniques and developments of Fuzzy Logic and technology.
- To encourage the scientific communication and collaboration among its members
- To assemble a group of specialists belonging to different academic fields and professional practices.
- To advise associates and companies on subjects regarding Fuzzy Logic and Technologies and other related matters.
- To represent the European researchers in Fuzzy Logic and their technologies at the IFSA council.
- To establish relations with other national or international Associations with similar aims.
- To organise, promote and sponsor conferences, workshops and seminars.

EUSFLAT provides to its members the following services:

- An e-mail distribution list to disseminate information, discuss issues, suggest open questions, etc.
- A data base of research groups, practitioners and industries working in Fuzzy Systems or using Fuzzy Technologies in their development or products.
- An Internet Server announcing Conferences workshops, seminars, Research Groups, Research Projects, books, etc.
- Reduced registration fees for the Conferences organised or sponsored by EUSFLAT and other scientific Societies.
- Reduced rates for personal subscriptions to the following journals: Fuzzy Sets and Systems (FS&S), International Journal of Approximate Reasoning (IJAR), International Journal of Uncertainly Fuzziness and Knowledge-based Systems (IJUFKS), Journal of Advanced Computational Intelligence (JACI), Mathware and Soft Computing (M&SC), and Busfal. Agreements with additional journals will be sought.

Membership fee: 38 Euro / year

Electronic Registration Form:
http://decsai.ugr.es/eusflat/registration.html

Contact Address

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Campus de la Universitat Autònoma de Barcelona
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Info: http://decsai.ugr.es/eusflat/eusflat.html

IMACS

3rd MATHMOD Vienna

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

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

The scope of the conference covers theoretic and applied aspects of the various types of mathematical i.e. formal modelling (equations of various types, Petri nets, bond graphs, qualitative and fuzzy models etc.) for systems of dynamic nature (deterministic, stochastic, continuous, discrete or hybrid with respect to time etc.). Comparison of modelling approaches, model simplification, modelling uncertainties and the impact of items such as these on the problem solution, validation, automation of modelling and software support for modelling etc. will be discussed in special sessions as well as applications for control, design or analysis of systems in engineering and other fields of application.

The scientific program will be highlighted by the following invited lectures (prel.): Modelling Dynamical Systems Using Manifest and Latent Variables (J. C. Willems, Univ. Groningen, The Netherlands); Reverse Engineering in Modelling and Simulation (D. Murray-Smith, Univ. Glasgow); Soft Computing in Modelling and Simulation (NN).

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

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

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

Deadline for submission of extended abstracts (1 - 2 pages in triplicate) is May 15, 1999.

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

Information:
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Web site:
http://simtech.tuwien.ac.at/3rdMATHMOD

SCS International

The Winter Simulation Conference: The Premier Forum on Simulation Practice and Theory

Chairs: James R. Wilson David T. Sturrock Gerald W. Evans

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

WSC 99 will be held December 5-8, 1999, at the Pointe Hilton Resort at Squaw Peak in Phoenix, Arizona. This years theme will be "Simulation – A Bridge to the Future." This four-day conference will help you discover how the latest breakthroughs in simulation technology can change the way you solve future problems.

The conference will include application tracks on manufacturing, transportation and logistics, military applications, and general applications. A special feature this year will be minitracks in the areas of Call Centers, Business Processes, Semiconductors, Healthcare, Entertainment, Construction Engineering, and Project Management. Vendors will give sessions on the new and special features of their software, and the exhibits area will have displays by the leading simulation software vendors.

For new and experienced users interested in learning more about simulation, there are the introductory and advanced tutorial tracks. For those interested in the latest research, there are tracks on modeling and analysis methodology. For Ph.D. students, the conference offers the INFORMS/CS-sponsored Ph.D.-student colloquium and poster session. In total, there will be eleven tracks, including more than 150 state-of-the-art presentations.

All of the sessions and tracks are documented in the highly esteemed WSC Proceedings. Each registrant will receive a hardcover copy of the WSC Proceedings as well as a copy on compact disk (CD).

WSC is currently soliciting contributions to the technical program. International simulation specialists are encouraged to apply. For deadlines and registration information, please visit the WSC web site at http://www.wintersim.org or contact Talley Management Group, Inc. Meetings Department by calling them at +1-609-423-7222 or by email meetings@talley.com.

Eva Dobrov, WSC Publicity Chair 1999

INFORMS College on Simulation

The following awards were presented during the opening ceremonies of the 1998 Winter Simulation Conference, on December 14, 1998, in Washington, DC. More information can be found on the INFORMS server at http://www.isye.gatech.edu/informs-sim/.

W. David Kelton Receives 1998 Distinguished Service Award from INFORMS-College on Simulation

Professor W. David Kelton of the University of Cincinnati received the 1998 Distinguished Service Award from the Institute for Operations Research and the Management Sciences-College on Simulation (INFORMS-CS) for his outstanding contributions to the College, to the Winter Simulation Conference (WSC), and to the international simulation community over a period dating back to 1980.

The Distinguished Service Award, designed to recognize each year at most one individual who has provided "long-standing, exceptional service to the simulation community … acquitted with distinction," was first awarded in 1986. The 1998 selection committee, chaired by Thomas J. Schriber (The University of Michigan), was additionally composed of James R. Wilson (North Carolina State University), and Bruce W. Schmeiser (Purdue University).

David Kelton has played a set of major roles in the Winter Simulation Conference series dating back to 1986 and continuing to this day. He has also been very active in the INFORMS-College on Simulation. In addition Professor Kelton has provided very substantial service to the broader simulation community in a series of editorial posts over many years and he has also refereed and reviewed several hundred papers for several dozen journals and conferences.

Quite apart from his editorial activities, which are services that support the verification and dissemination of quality research being conducted by other simulation professionals, David Kelton has himself also made significant research contributions. He has authored or coauthored some two dozen research articles published in archival journals, and in 1982 he received the INFORMS-CS Outstanding Simulation Publication Award.

David Kelton is also coauthor of a landmark simulation textbook, Simulation Modeling and Analysis (first edition 1982; second edition 1991), which is in widespread use around the world and has been referenced in over 500 refereed-journal research papers to date. He is also more recently a coauthor of another book, Simulation with Arena (1998).

Julian Reitman Awarded First Lifetime Professional Achievement Award

The INFORMS College on Simulation is pleased to recognize Julian Reitman with its first Lifetime Professional Achievement Award (LPAA). The Selection Committee consisted of Steve Roberts, David Goldsman, and Gordon Clark. The LPAA award, given at most once a year, was established "to recognize major contributions to the field of simulation that are sustained over most of a professional career." Certainly Julian Reitman epitomizes that ideal. His active career in simulation has covered more than forty years, virtually spanning the history of modern computer simulation.

Julian Reitman was on the frontier of simulation application and he pioneered many simulation developments. And he has generally been regarded as one of the "true" founders of the simulation community as we know it.

Almost from the beginning of his career in the late 1940s, Julian was thrust into the world of electronic analog computing and modeling. He was fortunate to make an early transition into the digital world in the

Award Presented by Thomas J. Schriber (left), Chair of the DSA Committee.

Award, presented by Stephen D. Roberts (left), Chair of the LPAA Committee

1950s, being asked to create computer and communications systems for airline reservations. Out of a frustration with limited analysis tools, he "discovered" computer simulation. In fact, it was probably Julian's prodding that caused IBM to make GPSS, its internal simulation language, public. In the 1960s, he was the leader of one of the first simulation application groups in industry – at the Norden Division of United Aircraft Corporation.

In the mid-1960s Julian played a leading role in the establishment of the IEEE Systems, Man, and Cybernetics Group, where he served as chair, was on the administrative committee, was on the Editorial Board of IEEE Press, and an associate editor of two IEEE journals.

Julian published the first article on simulation to appear in the IEEE general-interest publication in 1974 and numerous articles since then in other journals. As an outgrowth of his teaching courses in universities, in plants and locations throughout the world, he ultimately in 1971 wrote one of the first simulation textbooks, destined to be a classic, entitled Computer Simulation Applications: Discrete Event Simulation for Synthesis and Analysis of Complex Systems.

Julian was one of the founders of the Winter Simulation Conference (WSC). He has been the longest serving board member representing any society.

Julian's professional contributions to the field of simulation, especially in the application of simulation, are striking not only for their impact on the field, but also for the remarkably long period over which that impact has been sustained.

Classes on Simulation

March 1999

8-9 ***Kurs MATLAB.*** Munich, Germany.
Contact: BAUSCH-GALL GmbH, Wohlfartstr. 21b, D-80939 München, Tel: +49-89 3232625, Fax: +49-89 3231063, email: BauschGall@compuserve.com

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

15-17 ***Simulation mit SIMULINK.*** Munich, Germany.
Contact: BAUSCH-GALL GmbH

17 ***Einführung in die diskrete Simulation - @Risk, MicroSaint***. Seminar at TU Vienna, Austria
Contact: ARGESIM

18 ***MATLAB Programmierung***. Gümlingen. Switzerland.
Contact: Scientific Computers, Franzstr. 107-109, D- 52064 Aachen, Tel.: +49-241- 47075-0, Fax: +49-241- 44983, email: info@scientific.de

23-24 ***Simulation von Zustandsautomaten mit Stateflow***. Aachen, Germany.
Contact: Scientific Computers

April 1999

19 ***Kurs MECHMACS***. Munich, Germany.
Contact: BAUSCH-GALL GmbH

22 ***Anwendungen in diskrete Simulation - Arena***. Seminar at TU Vienna, Austria
Contact: ARGESIM

28 ***Symbolic Computation***. Seminar at TU Vienna, Austria
Contact: ARGESIM

May

3-4 ***Filterentwurf mit QuickFil***. Munich, Germany.
Contact: BAUSCH-GALL GmbH

17-18 ***Kurs MATLAB.*** Munich, Germany.
Contact: BAUSCH-GALL GmbH

17-21 **Mathematical Modeling and Digital Continuous Computer Simulation of Engineering and Scientific Systems**.
Lecturers: W.J. Karplus (UCLA, USA); H.J. Halin (ETH Zurich); J.U.Thoma (CH, f. Univ. of Waterloo, CND)
Contact: H.J. Halin, Tel: +41-1-632 4608 or 4603, Fax: +41-1-632 1166, email: halin@iet.mavt.ethz.ch, WWW: http://www.lkt.iet.ethz.ch/lkt/courses/

18-19 ***Einsatz von Matlab in der Regelungstechnik***. Aachen, Germany.
Contact: Scientific Computers

June

8-9 ***Einsatz von Simulink in der Regelungstechnik***. Aachen, Germany.
Contact: Scientific Computers

14-16 ***Simulation mit SIMULINK***. Munich, Germany.
Contact: BAUSCH-GALL GmbH

17 ***Kurs MECHMACS***. Munich, Germany.
Contact: BAUSCH-GALL GmbH

22-23 ***Simulation von Zustandsautomaten mit Stateflow***. Aachen, Germany.
Contact: Scientific Computers

Modellbildung und Simulation in der Abfallentsorgung.
Seminar at TU Vienna, Austria
Contact: ARGESIM

July

CCG-Kurs. ***Modellbildung und Simulation dynamischer Systeme*** (I. Bausch-Gall and F. Breitenecker).
Oberpfaffenhofen, Germany.
Contact: F. Breitenecker, TU Wien, Tel: +43-1 58801 11452, Fax: +43-1 58801 42098, email: Felix.Breitenecker@tuwien.ac.at or Carl-Cranz-Gesellschaft e.V., Postfach 11 12, D-82230 Weßling, Fax: +49-8153 281345, email: ccg@dlr.de

Comparisons of Simulation Tools and Simulation Technique

In 1990, in the first issue of *Simulation News Europe*, we started a series on "Comparison of Simulation Software". At that time, well-known comparisons for simulation software were the benchmark comparisons and the comparisons based on feature tables.

Our comparisons were initiated as a compromise between the benchmark comparisons and table comparisons (indicating "yes" or "no" with respect to the simulators' features). Based on simple, easily comprehensible models special features of modelling and experimentation within simulation languages, also with respect to an application area, are compared. The comparisons are based on simple, but significant models, they are testing up to three features, and they are easy to reproduce.

Features are, for instance: modelling technique, event handling, numerical integration, steady-state calculation, distribution fitting, parameter sweep, output analysis, animation, complex logic strategies, submodels, macros, statistical features, etc.

Twelve comparisons have been defined up to now, alternatively for continuous and discrete systems, and a special comparison on parallelisation. Nowadays the difference between pure continuous and pure discrete systems is vanishing. Therefore the newer comparisons, esp. C9 - Fuzzy Control, can be solved by different approaches. Consequently also our next comparisons (to be published in the next issues) will take this development into account.

We are proud that up to now 164 solutions to the following comparisons could be published in SNE:

- Comparison **C1 Lithium-Cluster Dynamics under Electron Bombardment** (SNE 0, November 1990) deals with a stiff system. This comparison tests features for integration of stiff systems, for parameter variation, and for steady state calculation.
- Comparison **C2 Flexible Assembly System** (SNE 2, March 1991) for discrete simulators, compares features for submodel structures, control strategies, and optimisation of process parameters.
- Comparison **C3 Analysis of a Generalized Class-E Amplifier** (SNE 2, July 1991) focuses on simulation of electronic circuits, requiring table functions, eigenvalue analysis, and complex experiments.
- Comparison **C4 Dining Philosophers I** (SNE 3, November 1991) is more general, involving not only simulation but also different modelling techniques like Petri nets, etc.
- Comparison **C5 Two State Model** (SNE 4, March 1992) primarily addresses simulation tools with very high accuracy (checking integration and state event handling), but can also be treated by means of tools for symbolic computation !
- Comparison **C6 Emergency Department – Follow-up Treatment** (SNE 6, November 1992) addresses discrete simulation languages and tests features for modelling, concepts of availability, and complex control strategies.
- Comparison **C7 Constrained Pendulum** (SNE 7, March 1993) checks features for model comparison, state events, and for boundary value problems. This comparison shows

SNE	Comparison											
	C1	C2	C3	C4	C5	C6	C7	CP 1	C8	C9	C10	C11
0	Def											
1	5	Def										
2	4	4	Def									
3	4	3	3	Def								
4	1	5	5	2	Def							
5	4	-	1	1	2							
6	-	2	-	2	1	Def						
7	1	2	1	2	-	1	Def					
8	-	1	-	-	-	1	3					
9	-	-	-	-	-	2	3					
10	1	2	-	-	-	1	2	Def/1				
11	2	2	1	-	1	-	-	2				
12	1	-	1	-	-	-	2	3				
13	-	-	-	-	-		3	1				
14	3	-	1	-	-	-	2	-				
15	-	-	1	-	1	-	-	-				
16	1	-	-	-	-	-	1	-	Def/1			
17	-	-	1	-	1	-	1	1	1	Def/1		
18	-	-	-	-	-	-	2	2	-	-	Def/1	
19	-	-	-	-	-	-	-	1	1	1	3	
20	-	-	-	-	-	-	1	-	1	1	2	
21	-	1	-	1	-	1	5	-	-	-	2	
22	1	-	1	-	1	-	5	-	1	-	-	Def/1
23	-	2	-	-	-	-	-	-	-	2	-	1
24	1	-	-	1	-	-	2	-	-	-	1	2
25	-	1	-	-	1	-	1	-	-	3	1	1
Total	29	25	16	9	8	6	33	11	5	8	9	5

interesting aspects with respect to hybrid modelling approaches.

- Comparison **CP1 Parallel Simulation Techniques** (SNE 10, March 1994) deals with the benefits of distributed and parallel computation for simulation tasks. Three test examples have been chosen to investigate the types of parallelisation techniques.
- Comparison **C8 Canal-and-Lock System** (SNE 16, March 1996) checks features for modelling complex logic control and variance capabilities. This comparison underlines the necessity of exact validation of scheduling priorities.
- Comparison **C9 Fuzzy Control of a Two Tank System** (SNE 17, July 1996) asks for implementation and / or modules for fuzzy control in combination with sampled data systems. Originally designed for continuous simulators, now nearly pure discrete approaches show exact results.
- Comparison **C10 Dining Philosophers II** (SNE 18, November 1996) reviews discrete simulators with respect to simultaneous (concurrent) access to resources and with respect to deadlocks.
- Comparison **C11 SCARA Robot** (SNE 22, March 1998) deals with handling of implicit systems and again with state events and / or hybridisation of model approach and control.

Our journal SNE went through different steps of development, so did our comparisons. In 1998, we were faced with the following questions:

- How long shall a comparison run (in order to have up-to-date solutions which can be compared) ?
- Should more than one solution with the same simulator be accepted, how much do the solutions have to differ ?
- Does it makes sense to repeat a solution with a newer version of the simulator (many simulators have developed powerful environments which increase the features essentially) ?
- Who shall solve the comparisons ?

After discussions and careful analysis of the solutions already received, it was decided

i. to continue a comparison, and not to finish after a certain period – in order to keep the number of comparisons low and to keep a continuation of the evaluation,

ii. to accept new solutions with an up-to-date version of a simulator, which was used in an older solution – in order to show the development of the simulators,

iii. to invite all "simulationists" to prepare a solution (users, developers, distributors) as long as the solution solves all the tasks and is not "too advertising"; and at the same to publish solutions by members of our ARGESIM team, in order to stimulate e.g. solutions with new or unconventional methods (e.g. this SNE, solution with Excel),

iv. and to accept more than one solution with a certain simulator, if they differ in the approach, method, methodology – in order to show the broad variety of methodological approaches to a certain simulation task, and to be open to new areas like soft computing, symbolical computation, etc.

Especially iv) resulted in a very important step in the development of the comparisons – the comparisons now not only compare features of simulators, they also show different methodological approaches and they are open now for "unconventional" methods.

Consequently we call the comparisons now the

ARGESIM Comparisons of Simulation Tools and Simulation Technique

The term "simulation tool" stands for a software tool which can be used for modelling and simulation (from FORTRAN to OO languages, from special simulators to Excel), and the term "simulation technique" stands for the approach, method or methodology used in the solution, from a continuous to a discrete approach, from structure models to data models, from numerical to analytical methods, etc.

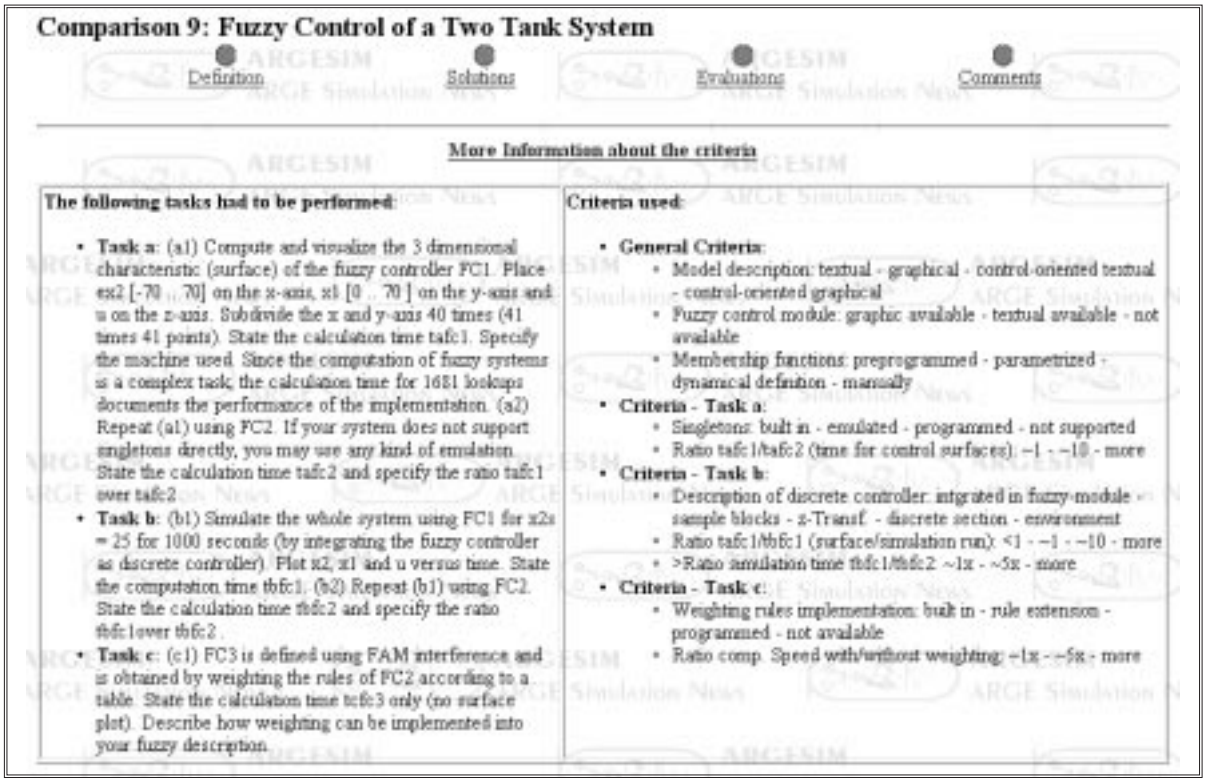
Furthermore, the comparisons found an organisational an administrative home in the working group ARGESIM. In close co-operation with experts from other simulation societies, and with publishing help from ASIM's working group on "Simulation Software and -Hardware (presently changing its aims and name to "Simulation Tools and Methods"). This support allows for instance the evaluation of the comparisons via database and the representation of this evaluation at ARGESIM's WWW server:

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

The evaluation is based on criteria formulated by the authors of the definition in co-operation with specialists in ARGESIM. There are

- up to three criteria, with up to five predefined classifications for the modelling approach,
- up to three criteria for each task, with up to five predefined classifications,
- and one criterion for the methodological evaluation, with up to five classifications.

The screenshot shows the overwiev for this kind of evaluation for comparison C9, Fuzzy Control of a Two Tank System. Most of the items are self-explaining, and – linking to the comparison definition – a motivation for chosen classification items is offered.



These evaluations build up a very powerful basis for comparing via WWW not only features of simulators, but also different approaches, methods and methodologies. Especially in case of C9, the evaluation gives interesting insight

i) into different approaches for modelling sampled data fuzzy controlled systems, and

ii) into the implementation and efficiency of fuzzy modules.

There, the idea of a data model for the control surface (which allows fast interpolation) can be met, as well as a fully functional (but slow) algorithm.

We would appreciate if this issue of SNE could motivate simulationists to participate in these comparisons. We invite you to simulate the model(s) with any tool of your choice, with any (successful) approach, and to send us a report in the following form:

- short description of the "simulation tool",
- comments on the approach used,
- model description (part of source code, diagram, ...),
- and results of all tasks with experimentation comments (if a simulator does not support the solution of a certain task directly, an experienced simulationist may find a work-around !),
- in max. 1 page in SNE format. For publication in *Simulation News Europe* all contributions that exceed one page will be modified by the editors to fit into one page. Reports of solutions of the Parallel Comparison should not be more than one and a half page in length.

Solutions may be sent in on diskette, by email (as attachment), in any word processing format, figures as separate files in any format.

The definitions of all comparisons, and an overview on the solutions sent in may be found on our WWW server: http://www.argesim.org/comparisons/.

This year we intend to publish two new comparisons. For SNE 26 we plan to define a comparisons quite different from the classical ones, a comparison addressing tools for modelling with neural nets (in co-operation with the University of Oulu). SNE 27 (November) will bring a "revised" version of C2, Flexible Assembly System, with new tasks and more "stochastics".

We would like to thank all who have helped us, at present or in the past, in defining comparisons, in publishing solutions, in maintaining the WWW evaluation, and, last but not least our readers who – as we hope – appreciate the comparisons.

F. Breitenecker, I. Husinsky

Comparison 2 – ProModel
Process-oriented Modelling Approach

ProModel is a powerful, Windows based simulation tool for simulating and analysing production systems of all types and sizes. ProModel provides the perfect combination of ease-of-use and complete flexibility and power for modelling nearly any situation, and its realistic animation capabilities make simulation come to life.

The model actually consists of one sub-model which is merged eight times into the model itself (figure1). After merging it was only necessary to adjust the logic of each section. The sub-model contains the definition of the entity routings and consists only of two different types of locations: conveyors (length and speed is changeable by a macro) and spots, where decisions are made for further routing.

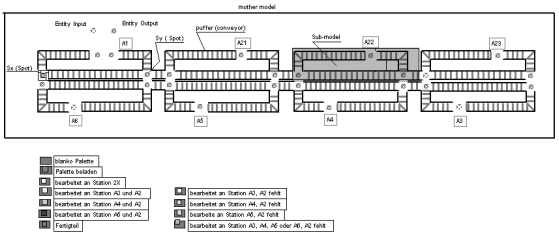


Figure 1

Defined in the model are four variables, two entities (palettes and raw material), 10 attributes, 8 macros and 11 different graphics (each of them representing a different state) for the palette entity. Palettes (the total number in the system is changeable by a macro) are circulating in the system during the simulation. At station A1 the palette attribute "time stamp" is set to the actual simulation time. When one palette finishes the process through the whole system, the throughput time for this palette is measured and the counter for the number of palettes is incremented. At location Sx (spot), A2Sx, A3Sx,... each palette is checked whether it's authorised for shifting to the various buffers. Each conveyor automatically calculates his free capacity. If one palette is unauthorised (due to capacity restrictions or to different production states) it moves along the main path B1.

ProModel's output generator gathers statistics on each location, entity and variable in the system. Simulation results may be presented in either tabular or graphic format, including histograms, pie charts, plots and bar graphs.

After running the model with various different scenarios (warm-up time = 2 hours, run-time = 8 hours) **results** are as follows: The number of throughputs (~1440) stayed nearly the same with 20, 40, 60 palettes in the system. The average throughput time increased nearly on a linear basis (399sec, 800sec, 1200sec). With 20 palettes all stations A2-A5 were well occupied, only A6 was idle. The scenarios with 40 and 60 palettes led to the same results.

Therefore the scenario, chosen for task c, showed that the best solution is 13 pallets (objective function: compromise between throughput and time) to use in the system (figure 2).

Number of Pallets	Total Throughput	Average Throughput Time in sec.
10	960	300
11	1110	285
12	1260	274
13	1410	265
14	1440	280
15	1440	300
16	1440	320
17	1440	340
18	1440	360
19	1438	380
20	1442	399
30	1440	600
40	1440	800
60	1440	1200

Figure 2

ProModel provides a simulation and optimisation suite where the optimisation package SimRunner is a fully integrated tool. SimRunner uses "factorial design of experiments" method (DOE) and sophisticated optimisation algorithms. In SimRunner various objective functions can be defined for optimisation.

Development and Execution times: The model required 1.5 days to design and the scenarios claimed another 5 hours to run and to evaluate.

The model execution time varied depending upon the number of pallets in the system and whether the animation is on or off. With 20 pallets in the system and without animation, the model runs within 2,5 minutes on a Pentium II 350MHz PC.

For additional information and comments please contact: Dipl.-Ing. A.Karrais, O.Schöllhammer, GBU mbH, Softwarezentrum Böblingen/Sindelfingen, Otto-Lilienthal-Straße 36, D-71034 Böblingen, Tel: +49-7031-714-864, Fax: +49-7031-714-865, email: info@gbumbh.de, http://www.gbumbh.de

Comparison 5 – Maple V.5
Algebraic Approach

Maple V Release 5 mainly used for symbolic mathematical calculation, offers also features for numerical calculation. It is more general than a simulator, and it allows arbitrarily high accuracy, by "emulating" arbitrarily long mantissas. Furthermore, special packages for (symbolic) calculation in several areas e.g. Algebra, Basic Mathematics, Calculus, Discrete Mathematics, Linear Algebra etc. are available.

Model i): One may use straightforwardly Maple's `dsolve` ODE solver, which results in a procedure for calculation of the solution over a given time grid. First the equations are defined, then the solution procedure is set up (`dsolve` uses symbolical calculations). Maple does not provide any event handler, even in case of numerical solution in `dsolve`, so that only in a time loop a change of the states can be realized:

```
>dgl:={diff(y1(t),t) = c1*(y2(t)+c2-y1(t)),
       diff(y2(t),t) = c3*(c4-y2(t))};
> solution:=dsolve({y1(t),y2(t)});
>c2_state1 := 0.4; c4_state1 := 5.5; state1 := 1;
>c2_state2 := -0.3; c4_state2 :=2.73; state2 :=2;
>upper_bound_y1 := 5.8; lower_bound_y1 := 2.5; ....
>step := 0.001;time:= 0; state_t := time; ......
>while (time <= endtime) do
>if state = state1 then
>y1_wert := y1_func(time,c2_state1,c4_state1,
                   state_t, y1_old,state_t,y2_old);
>y2_wert := y2_func(time,c2_state1,c4_state1,
                   state_t,y1_old,state_t,y2_old);
>    if y1_wert >= upper_bound_y1 then
>     state := state2; state_t := time; ......
>printf  ...........
>if state = state2 then ...........
>y1_wert := y1_func(time,c2_state2,c4_state2,
                   state_t,y1_old,state_t,y2_old);
```

Task a, b: Fig. 1 shows the result for y_1 (loop stepsize = 0.001). The procedure gives the discontinuities time instants, i.e. 1.109, 2.131, 3.056, 4.078, and $y_1(5)$ =5.799. In the loop these time instants are not found with adequate accuracy, so that also the last discontinuity is not found. Increasing step size to 0.0001 does not improve accuracy. Trying to increase accuracy (`digit > 20`) stops with error. This approach is not able to solve the problem.

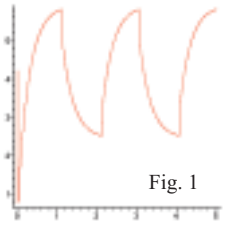


Fig. 1

Model ii) Basis of a much better approach is the diagonalisation of the system, so that the eigenvalues λ_i are known, and so that the time instants of the discontinuities t_k can be calculated in advance by inverting the e.g. the solution $z_1 = 5.8 = K \cdot \exp(\lambda_1 t_k)$. The original system $y = Ay$ is transformed by $y = Pz$ to a system $z = Cz$, where $C = P^{-1} \cdot A \cdot P$ is diagonal, with the eigenvalues as elements. The following Maple procedure implements this idea: in a loop the five (or more, in case of task d) discontinuity time instants are calculated nearly exactly in advance.

```
>A:=matrix(2,2,[-c1,c1,0,-c3]);
>J:=jordan(A,'P'); P_INVERSE:=inverse(P);
> vdgl:={diff(z1(t),t) =
-c1*z1(t)-c2*(c1-c3)+c3*c4, diff(z2(t),t) =
-c3*z2(t)+c3*c4};
>vsol:=dsolve(vdgl{z1(t),z2(t)});...
>Digits:=10; ..........
>t1:= t0; t2:=t0;upper_z1:=-3.99992341593; .....
>for i from 1 to 5 do
> if ( z1 > 0 ) then z1 := -z1 fi;
>t1_new:=t1_func(c1_1,c2,c3_1,c4,
>                t1, z1,bound_z1);
>t2_new:=t2_func(c1_1,c2,c3_1,c4,
>                t2, z2,bound_z2); .......
matr:=subs(c1=c1_1,c3=c3_1,
multiply(P,vekt));
```

Task c: Using model ii), time instant for discontinuities can be calculated with arbitrary accuracy. The table shows results for 10 significant digits.

	Eq. z_2
t1	1.108305798
t2	2.129684601
t3	3.054151774
t4	4.075530577
t5	4.999997750
$y_1(5)$	5.399968762

Model ii) would also be able to solve task a) by adding a simple line calculating intermediate values between the a priori calculated discontinuities.

Different accuracy results, if Maple's system parameter digits is set to the number of significant digits (table below, 20 and 30 digits).

	Digits = 20	Digits = 30
t1	1.1083057974005162953	1.10830579740051629528032830433
t2	2.1296846005419350004	2.12968460054193500037254272854
t3	3.0541517724101310612	3.05415177241013106111880241619
t4	4.0755305755515497664	4.07553057555154976621101684041
t5	4.9999977474197458271	4.99999774741974582695727652807
$y_1(5)$	5.3999687068206135989	5.39996870682061359898937080042

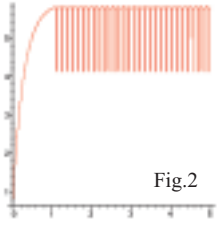


Fig.2

Digits = 20
1.1083072712524048662
1.1237698900377239008
1.2366022192317106568
...
4.9288607626522727931
4.9571557106315785836
5.7746490124112992332

Taskd: Model ii) gives almost exact results, although the change of parameters result in a high frequent oscillating behaviour of state y_1 (fig. 2). The table above gives the first three and the last two discontinuity time instants, and as last value the state $y_1(5)$.

This solution shows that symbolic packages are worth considering as simulation tool, especially, if symbolic or analytical methods are able to make the task (much more) easier.

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Comparison 7 – MAPLE V R5
Implicitly Segmented Modelling Approach

Maple is a widely used Computer Algebra System, but it contains also many numerical methods. This combination can be very useful for analysing models, especially if the ODEs have a symbolic solution or symbolic precalculations lead to simplified equations.

Model Description: The modelling approach of this solution changes the state space and uses the tangential velocity instead of the angular velocity (C7 - MATLAB/SIMULINK, SNE 22, p. 40).

The change of the length of the pendulum can be expressed using the *signum* function in the following model definition:

```
> modequ:=
{diff(phi(t),t) = v(t)/l(phi(t)),
 diff(v(t),t) = -g*sin(phi(t))-
 d/m*v(t)}:
> d:=0.2: g:=9.81: m:=1.02: phi_p:=-Pi/12:
>  Envsignum0:=1:
> l:=p->1+((signum(p-phi_p)-1)/2*0.7):
```

Task a. For solving the equation the RKF45 algorithm was used. Although there is no tool for managing the discontinuity of the length, the algorithm is accurate enough to get also the fourth hit (Fig. 1).

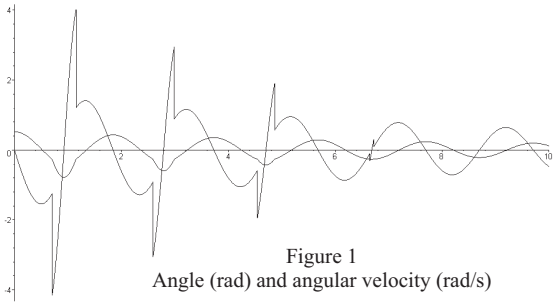

Figure 1
Angle (rad) and angular velocity (rad/s)

The commands for this experiment are:

```
> sol:=
dsolve(modequ union {phi(0)=Pi/6, v(0)=0},
{phi(t), v(t)}, type=numeric, method=rkf45, out-
put=listprocedure):
> v2:=subs(sol,v(t)):
> phi2:=subs(sol,phi(t)):
> dphi2:=proc(t) local vv,ll: vv:=v2(t):
ll:=l(phi2(t)): RETURN (vv/ll): end:
(recalculation of angular velocity)
```

If ODEs are solved numerically, Maple returns a procedure. The *Newton* procedure of the *share* library is used to calculate the hit times using a Netwon iteration on that procedure. The initial values have been estimated using the graph.

```
Hit times for Task a:
0.703459750, 1.151779632,
2.590419039, 2.990529351,
4.542744951, 4.867488270,
6.648754495, 6.720346972
```

Task b. The comparison between the linearized and the exact model is a very interesting task for Maple, because the linear model can be solved exactly, if the length is set constant. So the angle and the angular velocity can be expressed as functions of the length and the initial conditions:

```
>modequlin:={m*l*diff(phi(t),t$2)=-m*g*phi(t)-d*l*d
iff(phi(t),t)}:
> sollin:=dsolve(modequlin union {phi(t0)=phi0,
D(phi)(t0)=dphi0}, phi(t)):
> phi3:=unapply(subs(sollin,phi(t)),
(t,t0,l,phi0,dphi0)):
```

With these functions an exact solution can be constructed by calculating the time at the hit events and starting from there with new initial conditions:

```
> philin := unapply(piecewise(
t<t[1],phi3(t,0,1,Pi/12,0),
seq(op([t>=t[i] and t<t[i+1],
phi3(t,t[i],1-((i mod 2)*0.7),
phi_p,dphi3_t[i])]),i=1..7),
t>=t[8],phi3(t,t[8],1,phi_p, dphi3_t[8])),t):
```

In parallel numerical methods (RKF45) for the non-linear model and algebraic calculations for the linear movement and the difference between them are used.

The non-linear model produces slightly different hit times than the linear one:

Hit times for task b:

non-linear	linear
0.6948506328	0.6920233401
1.128097650	1.120544730
2.552981331	2.540860458
2.946194863	2.931799150
4.484701856	4.465755483
4.809726700	4.790786113
6.559776777	6.532057557
6.670940042	6.652995455

Figure 2 shows the difference between linear and non-linear model.

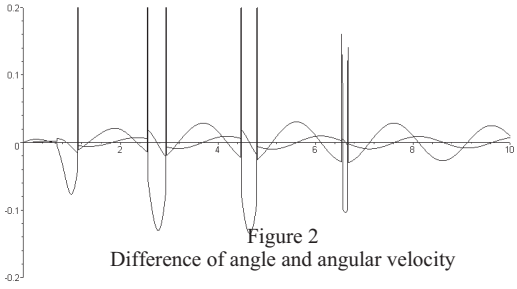

Figure 2
Difference of angle and angular velocity

Task c. This problem can be converted into an initial value problem with inverse time. So the initial conditions are $\varphi = -\pi / 2$ and $\dot{\varphi} = 0$. Then the *Newton* procedure is used to calculate the time, when the angle reaches $\pi/6$ and the angular velocity can be calculated.

```
> ph:=proc (t) [evalf(phibc(t)-Pi/6)]; end:
> tbc:=subs(Newton(ph,t=0.5),t):
> dphi0:=dphibc(tbc);
dphi0 := -2.184699288277054
```

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Comparison 9 – LabVIEW
Continuous Approach / Algorithmic Model

LabVIEW (Laboratory Virtual Instrument Engineering Workbench) started as "simulator" for an engineering laboratory (circuits, control loops, mechanical elements, etc.). After a lot of extensions LabVIEW now offers also all features a graphical-oriented simulator for dynamic systems has to have. For modelling LabVIEWs library offers all standard blocks, like integrators, summers, and some logical elements. Additional blocks may be created by i) programming the function of the block in LabVIEWs graphical programming language "G", and ii) by identifying this code by an icon. Experiments are controlled in the "front panel", the interactive user interface.One of the new extensions of LabVIEW is the Fuzzy Logic Toolkit, for designing and implementing rule-based fuzzy logic systems for process control or expert decision making.

Model Description: The model of the Two Tank System with a fuzzy controller (figure 1) was built up by using standard blocks from the modelling library, and by creating additional blocks for the complex non-linearities, quite similar to other graphical simulators. The fuzzy controller is also modelled at graphical level, connection blocks for fuzzification, interference, and defuzzification (fig.1).

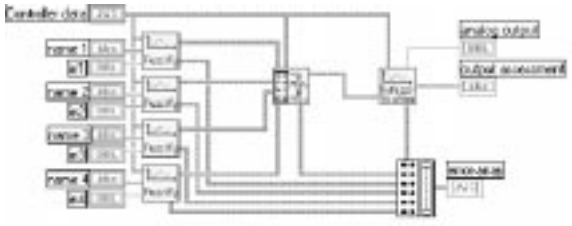


Fig. 1: Graphical model of the fuzzy controller with error handling for input data out of range

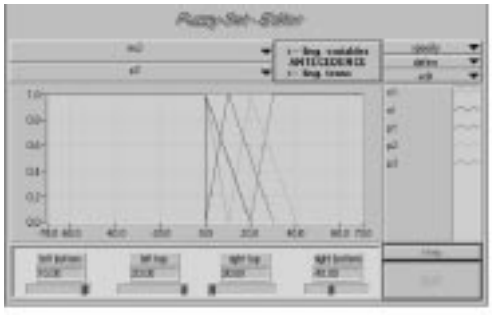


Fig. 2: Fuzzy set editor with input membership functions for FC1

The "fuzzy blocks" can by parameterised user-friendly by means of the "Fuzzy Set Editor" (fig 2). There, standard membership functions can be chosen, or new membership functions can be defined – in this comparison singletons had to be defined. Rules are defined in a "Rulebase Editor", where also weighting factors can be used.

Results: Task a) In LabVIEWs Fuzzy Toolkit the "I/O characteristics window" display the characteristic lines of the controller in a two-dimensional form (fig. 3), and a slider at the right allows to change the second input parameter, resulting in a change of the characteristic line. Looping this second parameter automatically, "simulates" the three-dimensional by a sequence of lines in the "I/O characteristics window". Computing and displaying times on a Pentium: **ta_{fc1}= 56 s** and **ta_{fc2}=51 s**.

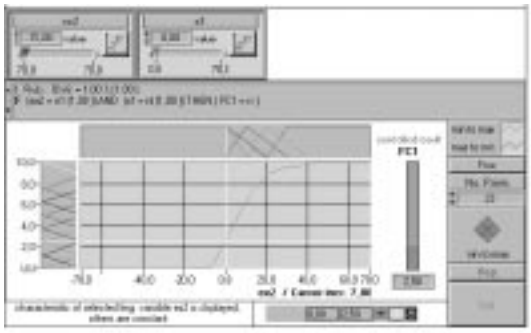
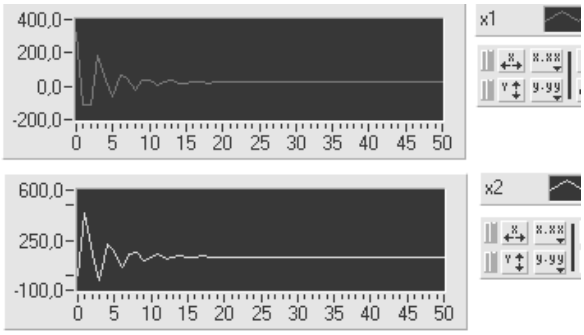


Fig. 3. I/O-Characteristic Editor for FC1

Task b) Simulating the whole system with FC1, FC2 and FC3 result in **tb_{FC1}=16 s** and **tb_{FC2}= 15 s**. Fig. 4 shows the results for FCx in the time domain:



Task c) Simulation time with weighting factors (FC3) is **tb_{FC3}= 17 s**. Weighting factors are a standard feature of LabVIEWs rule editor, furthermore the factors can be trimmed by means of optimisation algorithms, e.g. genetic algorithms, for achieving better controller performance.

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Comparison 9 – MS Excel
Discrete Approach / Datamodels

Microsoft's Excel is a well known object-oriented table based tool for manipulating and interpreting considerable quantities of data. Its front end offers tools like worksheets and charts on which a lot of standard functions can be used. With the help of various add-ins. Excel's abilities can be extended for a big part of more complex applications. In Excel table cells are used for both storing data and manipulating values of other cells. In the latter case cells contain mathematical or logical expressions the arguments of which are referenced cells. Furthermore, complex calculations can be implemented via Visual Basic for Applications. Nevertheless this solution of C9 shows that even the basic features of Excel allow to solve the complex task of a fuzzy system's implementation.

Model Description: An Excel table can be used for solving ODEs by the implementation of integration algorithms in rows, one for each time step. Columns then contain time, state variables, input variables and update functions of both. Here the dynamic refilling process was calculated by means of Euler integration. The fuzzy controller generates a one-dimensional output out of two input variables. It was evident to form m x n grids within the [x1,ex2]-plane that would contain discretised data of control output values, describing the nonlinear control surface. Further on this surface shall be referred to as "datamodel". The datamodel was taken to serve as basis both for the generation of the particular control output surfaces and for the calculation of the fuzzy control in the computation of the system's dynamic behavior. As no particular fuzzy tool was used the implementation of the membership functions (MFs) was done in a way to enable the use of triangular and trapezoidal MFs, as well as singletons.

The MFs of the input variables were discretized in the required step size for a 41x41 grid. For the MFs of the output variable u a step size of .25 was chosen for discretization. Rules, weighting and inference and defuzzification of the control output were formulated within the cells of several worksheets using standard Excel functions. For example in the following the Excel code for inference of MF p2 of output u:

```
=MAX(0,1*MIN(INDIREKT(ADRESSE($I$3;$A7/1,75+7;4;WAHR;
$A$6));INDIREKT(ADRESSE($E$4;C$6/3,5+27;4;WAHR;$A$6)));MI
N(INDIREKT(ADRESSE($K$3;$A7/1,75+7;4;WAHR;$A$6));
INDIREKT(ADRESSE($G$4;C$6/3,5+27;4;WAHR;$A$6))))
```

Task a is in this approach equivalent to the generation of the datamodel as 41x41 grid of control output values. For display standard Excel graphics features were used. The resulting surfaces FC1 and FC2 are shown in Fig.1. Times measured for calculation and display were (Intel PII 300, 128 MB) $ta_{fc1} \approx 6s$, $ta_{fc2} \approx 6s$, $ta_{fc1}/ta_{fc2} \approx 1$.

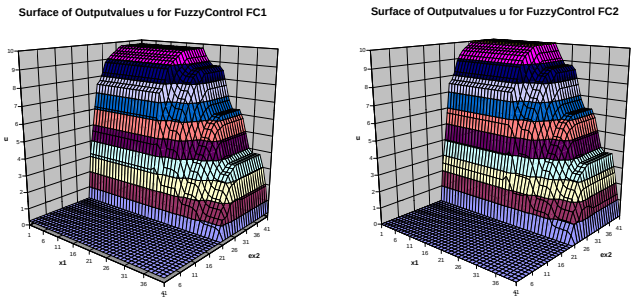

Fig. 1: Control Output Surfaces for FC1 and FC2

Task b: Singletons didn't cause any problems for the calculation due to the general formulation of the MFs. For simulation of the dynamic system the control output had to be referenced according to the particular values of x1 and ex2. For interpolation between neighboring discretized values of the datamodel a linear algorithm on the basis of the mean of two plane-interpolated values was implemented. The following lines show the Excel code for calculation of control u with FC2 (interpolation and limiting in case of too big discretisation errors):

```
=INDIREKT(ADRESSE(G16/1,75+7;H16/3,5+22;4;WAHR;$A$7))
=((M16-L16)*3,5*B16+(N16-M16)*1,75*E16+G16*(H16*N16-J16*M16
)+I16*(H16*(-L16+M16-N16)+J16*L16))/(3,5*1,75)
=WENN(E16<=0;0;WENN(UND(E16<=AA16;E16<=AB16);0,5*(Q16+
S16);WENN(UND(E16<=AA16;E16>AB16);0,5*(Q16+T16);WENN
(UND(E16>AA16;E16<=AB16);0,5*(S16+R16);0,5*(R16+T16)))))
```

As the system is updated in steps equivalent to 1s, the controller automatically acts as discrete controller with sample time 1s. Observed calculation times for the simulation and the display of its results were $tb_{fc1} \approx 5s$, $tb_{fc2} \approx 5s$, and therefor $tb_{fc1}/tb_{fc2} \approx 1$. Simulation results were displayed using standard chart features. (Fig.2)

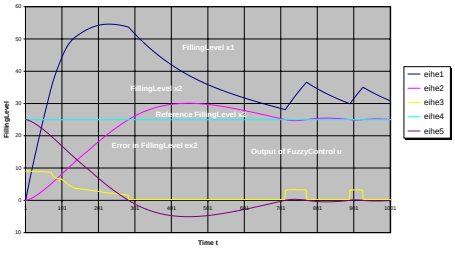

Fig. 2: System's Behaviour for FC1 Control

Task c: As fuzzification, inference and defuzzification are implemented manually using standard Excel functions, it was easy to implement weighting within inference itself. Calculation time for the surface FC3 was as well $tc_{fc3} \approx 6s$, therefor $ta_{fc2}/tc_{fc3} \approx 1$.

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Comparison 9 – MATLAB/SIMULINK
Continuous Approach / Algebraic Model

MATLAB is a widely used software tool based on numerical vector and matrix manipulation, SIMULINK is MATLAB's extension for graphical modelling and numerical simulation of dynamic systems. A MATLAB toolbox is available for implementation of fuzzy controllers.

Model Description: The model equations were implemented in MATLAB/ SIMULINK with standard blocks in a submodel. A `Zero-Order Hold` block was used to guarantee discrete control (fig. 1). SIMULINK offers a block to include a Fuzzy controller (designed by the MATLAB Fuzzy Toolbox.

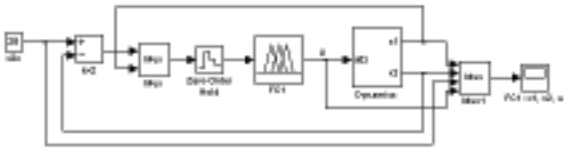

Fig. 1: Two Tank System and Fuzzy Controller in SIMULINK

The MATLAB Fuzzy Toolbox provides a graphical user interface (FIS Editor, fig. 2) for defining the fuzzy controller. First the user defines inputs and outputs, then the preferred types of membership functions can be chosen from a list and can be parameterised. Various methods for AND, OR implication, aggregation and defuzzyfication can be selected from pull-down menus. It is also possible to specify a m-file containing a user programmed method. Finally the fuzzy rules can be edited in the Rule Viewer.

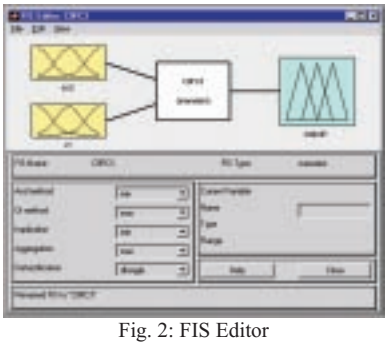

Fig. 2: FIS Editor

FC1 was solved with predefined functions. Since the toolbox does not offer singletons, both the definition of singletons and a defuzzyfication method had to be programmed for FC2:

```
function y=singltmf(x, params)
y=zeros(size(x)); a=params(1);
% Center (y = 1)
index = find(x == a);
if isempty(index),
 b=min(abs(x-a)); c=ones(size(x))*b;
 index=find(abs(x-a)==c);
end
y(index)=ones(size(index));

function out = dfsingle(x, mf)
total_area=sum(mf);
if total_area==0,
 error('dfsingle: Total area is zero;
end
out=sum(mf.*x)/total_area;
```

For both functions input `x` is a vector containing the discretisation of the considered linguistic variable. `Params` characterises the membership function, here it is just the `x`-value of the singleton. `Mf` is a vector of function values of `x`.

Task a: The FIS Editor contains a Surface Viewer that visualises any output of the system versus any two inputs. Figures 3 and 4 show the control surface for FC1 and FC2 respectively. The surfaces are computed immediately after entering the desired discretisation so the times (ta_{fc1}=4s, ta_{fc2}=5.5, ratio=0.73) can not be given precisely.

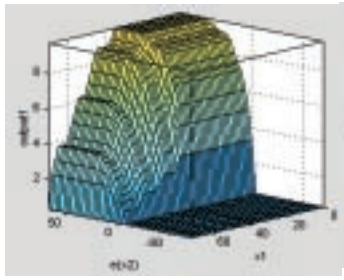

Fig. 3: Control Surface FC1

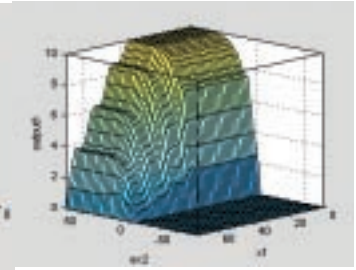

Fig4: Control Surface FC2

Simulation of the System (Task b): On a Pentium II 400 simulation of the whole system results in the following times: tb_{fc1}=.0.89s, tb_{fc2}=3.31s. The ratio is 0.26. The fuzzy controller is slowed down considerably by user-programmed methods.

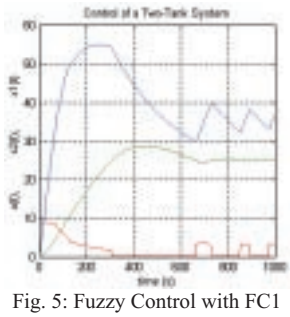

Fig. 5: Fuzzy Control with FC1

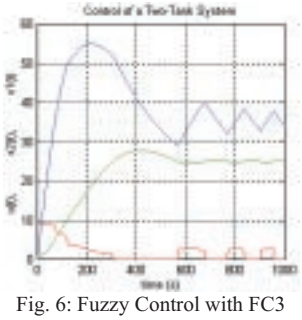

Fig. 6: Fuzzy Control with FC3

Weighting Rules (Task c): When editing the fuzzy rules with the FIS Editor one can assign a multiplier to each rule. Computation time was tc_{fc3}=3.31s.

General Remarks: The MATLAB FIS Editor is a comfortable tool for designing a fuzzy controller. Unfortunately on MS Windows it is not 100% stable so one will appreciate the UNIX version!.

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Comparison 10 – MATLAB-GPSS Toolbox Simulation Approach

MATLAB and its toolboxes provide a rich functionality for many scientific and technical computation purposes. The MATLAB-GPSS Toolbox extends MATLAB by a transaction oriented simulation method including methods for combined discrete event and continuous system simulation. The modelling language was designed to conform as closely as possible to GPSS and MATLAB. Furthermore it is possible to use pure MATLAB statements in a model description and it is also possible to integrate simulation runs into superior MATLAB based routines.

Model description: Models can be structured into different dynamic processes represented by transactions, and model statement sequences can be modularised into simple subroutines. The philosophers problem can be specified by different transactions, one for each philosopher. An additional structuring of model statements is not necessary, because of the very simple process structure. Figure 1 presents a full model description for an arbitrary number of philosophers including all statistical calculations and a user defined deadlock detection (bold lines). The declaration/initialisation part (*1-5*) defines the input and output parameters and initialises some specific variables. The model part (*6-25*) starts with the transaction generation and their numbering in a transaction parameter (*6,7*) . In the following, the process actions are modelled in a loop (*8-25*) . Most of the model statements are parametrised by indices to get transaction related statistics.

Results task i): Transactions (events) are arranged by move times and priorities in internal lists. Simultaneous events with the same priority are handled by FIFO strategy. In order to fulfil the defined strategy, the *two priority* statements (*15,18*) were inserted, which reorganise the internal event lists immediately. The first investigation with five philosophers was carried out from MATLAB with the two commands, *prepare ('phil.gpss')* and *deadlockT=schedule(1,0,5)*, where the *schedule* parameters are the termination counter, a debug flag and the input parameter. The run stopped with the result *deadlockT=322144*. Some of the statistical results are summarised in the table.

```
   % phil.gpss
1  inparms  nPhil              %number of phils.
2  outparms deadT              %deadlock time
3  init phil =0;               %phil. counter
4       stick=[1:nPhil,1];     %ring of sticks
5       left =0;               %left sticks in use
   model
6       generate(0,0,0,nPhil,0)  %phils. transacts.
7       phil=phil+1; P(1,phil);  %numb.phils.in P1
8  begin queue(P(1),1)           %begin thinking
9       advance(drand(1,1,10),0)
10      depart(P(1),1)
11      queue(P(1)+nPhil,1)      %begin waiting
12      seize(stick(P(1)));      %get left stick
13      left=left+1;
14      if left==nPhil,deadT=T;terminate(1);end
15      priority(-1)
16      seize(stick(P(1)+1))     %get right stick
17      depart(P(1)+nPhil,1)
18      priority(0)
19      queue(P(1)+2 * nPhil,1) %begin eating
20      advance(drand(1,1,10),0)
21      depart(P(1)+2 * nPhil,1)
22      release(stick(P(1)+1))   %put down right stick
23      release(stick(P(1)));    %put down left stick
24      left=left-1;
25    transfer(begin)
```

Fig. 1: Model Description of the philosopher problem

	Think.	Wait.	Eat.		Chop.Util.
P1	5.52	11.40	5.48	C1	0.92
P2	5.52	11.40	5.53	C2	0.93
P3	5.52	11.50	5.52	C3	0.93
P4	5.52	11.48	5.48	C4	0.93
P5	5.50	11.40	5.48	C5	0.92
All	5.516	11.436	5.498	All	0.926

Tab. 1: Some statistical results

Results task ii): The toolbox detects deadlocks automatically and stops the simulation with an error message. A user defined deadlock handling is presented in the model description *(bold lines)*. Multiple simulation runs can be performed using a superior MATLAB routine. Then the above model description has to be extended by a second input parameter, setting the random stream number in the model statements *(9,20)*. The runs can be executed in a sequential or in a parallel manner by using the DP-MATLAB toolbox. In this case a parallel solution is well suited, because the runs are independently. The following code shows an appropriate solution by using the master slave paradigm, where the task mapping is performed by the *dpeval* routine automatically.

```
function [minT,maxT]=phil(nPhil,runs)
  VdeadT=dpeval('phil_slv',nPhil,runs);
  minT=min(VdeadT); maxT=max(VdeadT);

function [deadT]=phil_slv(nPhil,runs)
  prepare('phil.gpss');
  deadT=schedule(1,0,nPhil,dpmyid);
```

The returned minimum and maximum deadlock times were 28565 and 18043683.

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Comparison 11– MATLAB/SIMULINK
Numerical Inversion / Hybrid Approach

MATLAB is a widely used software tool based on numerical vector and matrix manipulation, SIMULINK is MATLAB's extension for graphical modelling and numerical simulation of dynamic systems.

For this solution a hybrid modeling approach was chosen for task c: Execution of the SIMULINK model is controlled from the MATLAB environment.

Model Description (Task a): The robot model itself was implemented in two ways. First SIMULINK's `Algebraic Constraint` block was used and the implicit equation $b(q,\dot{q}) - M(q_2)\cdot\ddot{q} = 0$ directly implemented (including control):

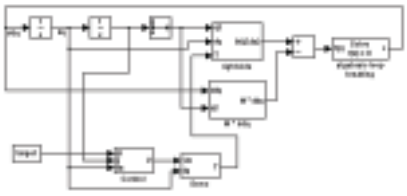

Fig.1: Implicit equations, algebraic loop breaking

For every integration step SIMULINK's Algebraic Constraint block 'searches' for a solution of the implicit equation. This procedure is comfortable and does also work in the presence of a Hit Crossing block (which was needed for task c)!

For the second (explicit) solution the systems mass matrix *M* was inverted symbolically outside MATLAB and the explicit equation $\ddot{q} = M(q_2)^{-1}\cdot b(q,\dot{q})$ implemented in SIMULINK (including control), resulting in a SIMULINK model without a block for algebraic loop breaking.

Both SIMULINK models are controlled at the MATLAB environment by an m-file. All parameters and constants are defined and all plots produced by that m-file.

Point to Point Control (Task b): For point to point movement both solutions use the same controller. A target vector is the input for submodel `Control` which contains the PD-Controller. The output `u` is fed into submodel `Servo` which models the servo drives. Finally the resulting torque `T` is provided for the calculation of the right hand side `b`. `U` is bounded by a `Saturation` block inside the submodel `Control`. Figure 2 shows the results graphically, the following table gives the processing times (using the commands 'tic' and 'toc'):

Model description	Norm. CPU-time
Task b) explicit - inverted matrix	1 (2.23s at PII 400)
Task b) implicit - algebraic loop breaking	4.09

Obstacle Avoidance (Task c): For collision avoidance a hybrid approach was chosen: MATLAB takes control over two phases (save and danger), changes parameters when necessary and starts the appropriate SIMULINK model.

Submodel `Control` was extended for both solutions. The distance between the obstacle and the tool tip is permanently checked. Depending on the status `save` execution of the model is stopped if the robot enters or leaves the restricted area (`Hit-Crossing` block). Control is then handed back to MATLAB. On entering, the active m-file changes the target positions for the state-variables to the current position and allows the emergency maximum voltages. The SIMULINK model is restarted with the changed parameters for the emergency manoeuvre. Just after the tool tip of the robot has reached an admissible height the SIMULINK model stops again. At MATLAB the original target position is reactivated and the SIMULINK model restarted again. This procedure could be repeated. All initial conditions for the integrators are updated with each restart of the SIMULINK model.

A part of the m-file: Change of parameters and start of the SIMULINK model for emergency manoeuvre

```
% prepare parameters for emergency manoeuvre
index=length(Ti); time=T(index); targetold=target;
target=[position(1:2),target(3)];
Umax=[U1mm,U2mm,...
dq10=DQ(index,1); ...q10=Q(index,1);
...I10=I(index,1);...
save=0; danger=1;
% start model for emergency manoeuvre
[Ti]=sim('C_11v2C_EX',[time,2]);
position=Q(length(Ti),1:3); ...
```

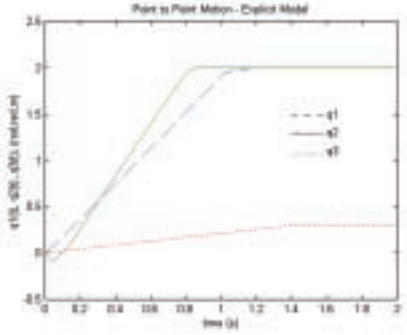

Fig. 2: Joint positions

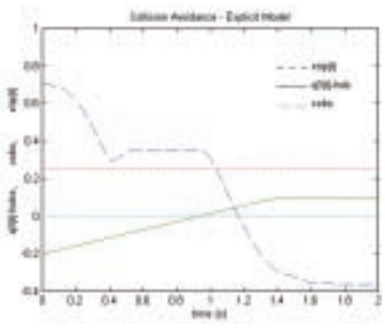

Fig. 3: Obstacle Avoidance

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European Network of Excellence for Fuzzy Logic and Uncertainty Modeling in Information Technology

supported by the European Commission - DG III Industry
ERUDIT Service Center

ERUDIT is an open Network of Excellence for fuzzy technology and uncertainty modelling applied to Information Technology in Europe. The Network's goal is to put Europe at the leading edge of international competitiveness in this area of Information Technology.

ERUDIT is open to European participants: departments of companies in industry and trade, SMEs, as well as public institutions, scientists, and practitioners in applied research institutions, and universities who are active in the domain covered by the Network. The members of ERUDIT are called "Nodes".

The long term overall objectives of ERUDIT are:

- to establish an efficient communication infrastructure between European scientists and practitioners interested in soft computing, in particular in uncertainty modelling and fuzzy technology.
- to stimulate innovation and advance research results.
- to define a platform for future developments in respective fields in sectors of the economy and academia.
- to encourage trans-European training activities in this field.
- to co-ordinate future research and application in this domain depending on the demand of European sectors of the economy.
- to promote technology transfer from universities to sectors of the economy and, more importantly, to transfer best practice among the industrial Nodes of the Network.
- to promote the growth of this technology into new technological directions.

The Network initialises and supports focussed technology transfer activities between Nodes and from Nodes to new potential application areas. It is active in the preparation and dissemination of reports on applications and research within the competence of ERUDIT. The promotion of stronger interaction between research and industry is a principal aim.

An important objective of the network is to promote research into applications. It is essential that the approach is application-oriented. Therefore the network has to aim to foster technology transfer between interested organisations in Europe. To this end it is crucial that academic as well as industrial and governmental organisations are among the active participants within the network. It is important to keep in mind that technology transfer is not being interpreted as taking place unidirectionally from academia to industry. Transfer of know-how about problem characteristics from industry to academia is considered as a very important activity to be encouraged within the network. Furthermore, it is equally important to cultivate the transfer of experience (and perhaps technology as well) between industries.

Many applications in various sectors of the economy of different uncertainty modelling techniques and especially the use of fuzzy sets have shown the potentials in solving complex problems. From the technological point of view a lot of applications could be imagined by researchers who are familiar with these techniques. On the other hand, practitioners and scientists with no experience in uncertainty modelling and fuzzy logic have to enhance their knowledge in using this technology. ERUDIT has been established to close the gap between researchers improving the techniques and the industrial users of those techniques. ERUDIT improves and expands the existing efficient infrastructure for the information and interaction of interested institutions and people. It includes electronic as well as other facilities (databases, etc.) to improve the coordinated European framework for research and development as well as for applications in the area of uncertainty modelling and fuzzy technology. The aim of this is to meet the Japanese and American challenge in these areas and to make European industry more competitive world-wide.

Leading companies like Siemens and other suppliers of control equipment are focussing on fuzzy technologies. The industries are investigating advanced control methods and decision support systems where uncertainty modelling and fuzzy logic are essential methods. Within industries these methods are considered important means to reduce production costs, to improve product quality, and for the reduction of environmental emissions. Some industries have been working for many years with fuzzy technologies and possess a lot of experience. Other industries, however, have just started investigations into advanced control and decision support. It therfore important to create a network where experience can be exchanged and transfer of technology can be initiated from one industry to another. Experience and positive results from one industry are considered the most efficient inspiration to other industries. ERUDIT contributes in a crucial way to the exchange of best practice between different industries, research institutions and industry.

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Petri Nets Research Group at the Research Institute for Informatics Bucharest

Modelling, optimisation and simulation of Discrete Event Systems (DES) are key subjects addressed in the projects developed at the Research Institute for Informatics in Bucharest. As a survey of the research activities in this area shows, several working groups are concentrated around the implementation of specific formalisms, reflecting the availability of expertise in a specific field. In particular, the Petri nets formalism has been investigated by a Petri nets research group, with emphasis on their application in production control.

Petri nets are the oldest and perhaps the best-established model of the discrete-time behaviour of systems in which it is possible for some events to occur concurrently but there are constraints on the occurrence, precedence, or frequency of these occurrences. Their main point lies in their identification both conceptually and mathematically of the basic aspects of concurrent systems and in particular in their intuitively appealing form, which facilitates understanding of the behaviour of systems by humans. The strong belief that Petri nets family of formalisms could be seen as an adequate working paradigm for manufacturing systems design and operation, to be used for their extremely broad range of problems, with the additional benefit of improving the communication and reutilization of results between stages of the life cycle, highly motivated the above working group's choice.

Most of the works were oriented towards providing the decision-maker with the methodology and tools necessary to support decision making in an operational environment. Researches were substantiated through theoretical contributions, studies, algorithms, and particular solutions.

Topics under study in this research area included:

- modelling production systems in view of an operational decision for production scheduling;
- implementing sometimes original simulation algorithms;
- implementing a modular system paradigm based on DEVS (Discrete Event System Specification) formalism and Petri nets to support a Petri nets based multifaceted modelling of complex systems;
- developing an algebraic approach for the Petri nets based modelling of DES aimed to simplify the Petri nets representation on the basis of rewriting and simplifying the algebraic expressions;
- defining a repository model base concept in the Petri nets context, which will help an user work with new constructs for structuring and abstractions in large scale and hierarchical systems.

The research results were mainly represented by software packages designed as a Petri nets based simulation shell, or particular applications, some are sketched in the following:

(1) The simulation shell *ModCPN* reflects the above research group's contribution to developing advanced tools supporting the modelling of discrete production systems. It will enable decision-makers to analyse problems and provide solutions to a wide range of applications, including: a) capacity planning; b) production scheduling; c) bottleneck identification; d) throughput analysis; e) cycle time reduction; f) part routing determination; g) downtime and change-over effects; h) maintenance scheduling. It is an *open system*, viewed as an *integrated set of tools*, managed by a supervisor, supporting build-up and use of Petri nets based models. The envisaged Petri nets, as theoretical foundation, fall under the following classes: P/T nets, CPN and timed transition Petri nets. The system provides tools to support the user in performing different phases of the simulation process: a) model editing; b) simulation and c) output analysis. ModCPN runs on IBM PC compatible computers and has been developed by applying a new object-oriented paradigm, using C++ language.

Within the graphical modelling component the modelling function takes two clear-cut steps: a) topological (static) description of Petri nets as a bipartite digraph; b) description of the initial marking, of the colour and temporisation functions. This tool supports CPN models with complex colour sets and complex arc expressions. There are two combined strategies used to model the behaviour of the environment of the system: a) places without preceding transitions; b) transitions without output places.

Within the simulation component two simulation strategies are at hand: a) *user driven simulation*, which lets the user to select a subset of the enabled transitions to fire and allows the simulation steps to be stored in the event file, hence to rollback to an earlier simulation state and examine alternative simulation runs; b) *automatic simulation*, based on a priority arrangement of the transitions and transitions firings in each marking according to this ordering. The simulation mechanism is based on an incrementally refined model structure so that the user faces a structure which resembles the role and nature of real-life system components.

Output analysis under Microsoft Excel will help the user evaluate performance. It will provide information about: a) min/average/max value of cycle time and processing time; b) average/valid value of work-in-progress;

c) number of jobs completed for every part type. A machine utilisation analysis (loaded/vacant/breakdown average time) is also included.

(2) The weakness of the above set of tools lying in that, as now operating in the system, the modelling function claims for the user of the model description tool having basic knowledge in the field, urged the above research group to start up its current investigations aimed to perfect a systematic method supporting Petri nets based modelling of DES.

In this perspective, an algebraic approach supporting the specification of Petri nets based models as composite objects, has been proposed. It could be viewed as an alternative to the graphical constructions enabled by the Petri nets formalism, which will allow a concise representation of large complex systems. Given the definition of two composition rules (modelling the sequences and the parallel operations, respectively), algebraic expressions will be constructed until an overall model will be obtained. It is only when reaching the last phase of the algebraic construction that the Petri nets based overall model starts being developed.

(3) New concepts (a representative system of the input/ output transitions set, an identification trace), properties (morphism relations) and techniques (a coupling mechanism) have being developed in search for a natural, simple and powerful method for describing and analysing the flow of information and control in complex systems in terms of Petri nets. It is worth noticing the close relation between the research group's proposal for a Petri nets modelling approach at the structure level and (1) the highest level of DEVS hierarchy, (2) the C.A. Petri nets topology, and (3) some characteristic features of Petri nets, providing the generators for algebraic structures (dioids), which distinguish this approach from other Petri nets based modelling methods.

(4) More and more attention has been paid to generic component modelling and supporting representations to enhance re-usability and portability of existing and new simulation models. Focus has been on the study of the impact of recent developments in the DEVS framework for modelling and simulation in dealing with the repository model base concept, in an attempt at extending the new concepts and results to the Petri nets formalism. Most of the works were oriented towards an incremental approach of a model base architecture for production systems.

The following aspects of the components are covered by the current design of the model base:

- *compressed models*, which will make it possible to have a net with complex structure without getting the overall model representation too crowded, and
- *expanded models*, that show flashes of insight into how some activities are carried out.

(5) Recent developments are aimed to demonstrate that this systematic method represents a general approach to complex problems and could be nicely applied to the experimental frames for Petri nets based simulations. Their final aim is to integrate into a new setting a previously proposed modular approach to models specification with recent advances towards a modular synthesis of experimental frames for Petri nets based simulations. The approach is due to the research group's investigation of the mathematical relationship between the Petri nets formalism and DEVS.

Further research will be directed to taking most advantage of the topological characteristic features, algebraic structure and interpretations of DEVS key structures underlying the above-mentioned approach, in order to extract new properties.

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Websites of Interest

SNE publishes the addresses of websites of interest to the simulation community. Please let us know when you come across an interesting site.

Simulation Archive: A Simulation Archive has been established at North Carolina State University. The Archivist seeks letters, memoranda, publications, and memorabilia of all kinds that are relevant to the history of the field of computer simulation, including the history of related professional societies:

http://www.isye.gatech.edu/informs-sim/simarch.htm

SimCentral, The Modeling and Simulation Information Network, including "Consult with an Expert":

http://www.simcentral.com/

Information About Selecting Simulation Software, University of Pittsburg:

http://www.pitt.edu/~wjyst/simsoftwareinfo.html

A collection of "**Hotlinks**" to societies, simulation tools, companies etc. can be found at
http://www.argesim.org/hotlinks/

Self-Organizing Map for Data Mining in MATLAB: the SOM Toolbox

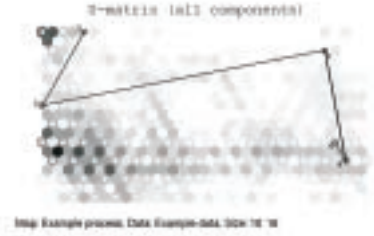
The SOM Toolbox is a free function library for MATLAB 5 implementing the Self-Organizing Map (SOM) algorithm which is a neural network algorithm based on unsupervised learning [1]. Basically it performs a vector quantization and simultaneously organizes the quantized vectors on a regular low-dimensional grid. The SOM has proven to be a valuable tool in data mining because it is readily explainable, simple and easy to visualize. It has been successfully applied in various engineering applications in pattern recognition, image analysis, process monitoring and fault diagnosis [2, 3].

Design goals: Thus far, the most useful implementation of the SOM and related tools has been the SOM_PAK . It is a public domain software package developed in the Neural Networks Research Centre of the Helsinki University of Technology, written in C language for UNIX and PC environments
(http://www.cis.hut.fi/nnrc/ nnrc-programs.html).

However, the Mathworks Inc.'s MATLAB has been steadily gaining popularity as the "language of scientific computing". Moreover, MATLAB is much better-suited for fast prototyping and customizing than the C language used in SOM_PAK, as MATLAB employs a high-level programming language with strong support for graphics and visualization. All of these properties are extremely important in data mining. SOM Toolbox is an attempt to take full advantage of these strengths and provide an efficient, customizable and easy-to-use implementation of the SOM.

While closely related to SOM_PAK, SOM Toolbox is, however, a new set of programs. Both program packages have their relative strengths and weaknesses. The advantages of SOM_PAK are that it is written in ANSI C and thus runs in virtually any environment. It is an order of magnitude faster than SOM Toolbox in training. The advantages of SOM Toolbox are mainly in user friendliness and visualization capabilities. If desired, the SOM_PAK files can be accessed with the Toolbox: it is possible to first train the SOM with the SOM_PAK and then use the Toolbox for visualization.

Realization: SOM Toolbox utilizes MATLAB structures and the functions are constructed in a modular manner, which makes it convenient to tailor the code for each users' specific needs. The use of structs allows the Toolbox to keep track of many kinds of information that greatly facilitate the data mining process: labels associated with individual data vectors, variable names, data normalization information and training log.



The basic usage of the SOM Toolbox consists of three steps: SOM initialization, training and visualization. To make things easier to the user, the high-level functions require minimum number of parameters. For example, SOM size and training parameters are, unless specified, determined automatically based on the training data.

```
>>sM=som_init(data); %initialization
>>sM=som_train(sM,data); %training
>>som_show(sM); %visualization
```

All this can also done through a graphical user interface. Around these three basic steps, SOM Toolbox has a large number of functions that can be used for preprocessing of the data and post-processing/analyzing the SOM.

Conclusions: We have found that the SOM Toolbox has greatly facilitated our research work. Implementation in MATLAB allows fast prototyping and powerful visualization. Building application specific tools on top of the Toolbox has proven to be easy.

Currently we are working on version 2 of the Toolbox. The major differences to the old version will be in visualization, which will utilize the newest research results in the field [4]. In addition, the package will include a larger set of supplementary algorithms and tools. Version 2 should be available during 1999.

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J.Vesanto, E.Alhoniemi, J.Himberg, K.Kiviluoto, J. Parviainen, Helsinki University of Technology, email: somtlbx@mail.cis.hut.fi, http://www.cis.hut.fi/projects/somtoolbox

EUFIT '98
6th European Congress on Intelligent Techniques and Soft Computing

From September 7-10, 1998 this international congress took place for the 6th time in Aachen, Germany. As the previous EUFIT conferences, it was a meeting place for delegates of various levels of expertise, from beginner to advanced practitioner, to get to know successfully exploited technical as well as management applications of intelligent technologies in different industrial sectors. It was an academic conference combined with the commercial relevance of an applied industrial event. The contrast of theory and practice offered an ideal forum to establish an efficient communication infrastructure between scientists and practitioners.

EUFIT '98 was attended by 531 participants and speakers from all over the world. It was composed of plenary presentations, semi-plenary sessions, panel sessions, invited and contributed sessions and other events. There were parallel and interactive sessions that included scientific and applied presentations in Fuzzy Technology, Neural Networks and Genetic Algorithms. The interactive sessions offered the possibility for communication between speakers and the interested audience.

Attendants at EUFIT

Lofti Zadeh talks at the Opening Session, chaired by Prof. Zimmermann

Heads of the conference EUFIT were the inventor of Fuzzy Logic, Professor Lotfi A. Zadeh (University of California, USA) as well as Professor Hans-Jürgen Zimmermann (RWTH Aachen, *ELITE Stiftung*, Germany). Supplementary to EUFIT, tutorials were offered on September 7, 1998 that dealt e.g. with Intelligent Knowledge Based Decision Support Systems (Prof. Dr. Hans-Jürgen Zimmermann, ELITE-Foundation, Germany), Fuzzy Clustering Models for Pattern Recognition and Control (Prof. Dr. James Bezdek, University of West Florida, USA), Evolutionary Computation and its Industrial Application (Dr.-Eng. Andreas Bastian, Volkswagen AG, Germany), Data Analysis Applications of Neural and Fuzzy Systems in Industry (Joachim Angstenberger, MIT GmbH, Germany).

The conference was accompanied by an international software, hardware and book exhibition. Leading suppliers demonstrated software and hardware products and special applications based on intelligent systems. Book publishers presented their books and journals related to the conference topics.

The 7th EUFIT conference will take place from September 13-16, 1999 in Aachen. If you are interested in participating and/or submitting a paper to the conference, please have a look at http://www.mitgmbh.de /elite/eufit.html or contact the conference secretariat:

EUFIT '99, c/o ELITE Foundation
Promenade 9, D-52076 Aachen, Germany
Phone: +49/2408/6969, Fax: +49/2408/94582
email: eufit@mitgmbh.de

SNE and ARGESIM at EUFIT

Following the idea of opening SNE and simulation activities to new areas related to modelling and simulation, SNE was presented at the EUFIT congress in Aachen, September 1998, as well as information about EUROSIM, ASIM and ARGESIM was spread.

ARGESIM informed about SNE, EUROSIM, ARGESIM and ASIM in a small booth (see photo next page), and we got much response from the about 500 participants.

We had also the opportunity the meet L. Zadeh in person, to show him SNE (see photo next page) and tell him about our ideas – and to convince him to prepare a short essay for an issue in 1999.

Two personal remarks: It was quite an experience to discuss with Zadeh, and – being sceptic about "Soft Computing", believing more or less only in ODEs and PDEs – Zadeh convinced me with a simple sentence: "The methods of soft computing enrich the area of modelling essentially, by their nature they result in crisp algorithms – but in algorithms one could hardly set up by classical tools".

F. Bretenecker and M. Lingl

Profs. Zadeh and Breitenecker

Secondly, I was surprised to meet ASIM members, whom I have met at ASIM conferences in former years, but not recently. This fact – also to be observed at conferences e.g. on computational mechanics, on finite elements, etc. – shows to me clearly that there are two possibilities for the future of *Simulation News Europe*:

- "to open to new horizons", to appreciate more the application areas, which nowadays are able to find their methodological simulation base themselves, - having a controlled growth in our simulation societies,
- or to restrict ourselves to "core simulation", closing the ivory tower of methodology (which may be a nice stay), - having a controlled decay.

F. Breitenecker

Industry News

System Simulation Without Detours: SIMPLORER V. 4.1

SIMPLORER – the reliable analysis and design tool is applied successfully since more than 15 years by developers of industrial electronics. Because of its universal and user friendly modeling capabilities the simulator passed the test just as well in the design of sensor-actuator systems, in the field of computer-aided analysis of controlled motor drives or power systems. The immediate connection of circuit and system simulation without "ifs" and "buts", realized by SIMPLORER within one tool, is a request cherished for a long time by a big number of development engineers.

The new features coming with the enhanced graphical user interface are, among others, the so-called Input Wizards, with whose help the users manage the parameter inputs also with more complex model elements (like for example transfer functions of higher degree or composite time functions) without long leafing through the manual. The representation for subsheets was improved, as well the handling of their parameters and connections.

SIMPLORER you can get in English and in German-language version. The system runs on standard PC's, 64 MB RAM recommended, under the operating systems Windows NT 4.0 and Windows 95/98.

You can order an evaluation version with the manufacturer gratuitously: SIMEC Simulation und Automation, Blankenauer Str. 74, D-09113 Chemnitz, Phone: +49-371 450 3 450 Fax: +49-371 450 3 466, Email: info@simec.com, Internet: http//www.simec.com. Your contact person: Dr. -Ing. Lutz Zacharias.

BAUSCH-GALL GmbH Distributor for ACSL

In January 1999, BAUSCH-GALL GmbH started as distributor for the ACSL-based simulation software products from AEgis Research in the German speaking countries. Main activities will be customer support, training, sales and ACSL-oriented project work.

BAUSCH-GALL GmbH continues to work as distributor for Dymola, a family of software products for object-oriented simulation from DYNASIM, Sweden. Based on a broad range of expertise in the solution of practical problems by effective computer application, BAUSCH-GALL GmbH will continue to serve the market for high-quality simulation.

BAUSCH-GALL GmbH, Wohlfartstr. 21b, D-80939 München, Tel: +49-89 3232625, Fax: +49-89 3231063, email: BauschGall@compuserve.com

DataEngine 3.0 - Intelligent data analysis

Intelligent data analysis has become extremely important in business. For 4 years now DataEngine has been and continues to be a reliable software tool using fuzzy technologies, neural networks and statistical methods. It generates information from a large multitude of data. This data derive from technical as well as from management applications. Examples: * Process optimization and process modelling * Database marketing * Data mining * Forecasting * Monitoring and diagnosis * Quality control.

In December1998 MIT GmbH presented the new version DataEngine 3.0. Survey of the most relevant innovations: * The new component for sensitivity analysis offers extensive possibilities for validation and visua- lization of the created

models. * The graphical programming language has been con- siderably expanded. It provides the user with a powerful and comfortable tool for efficient auto- mation of his tasks. * Based on OLE DB/ODBC a completely revised flexi- ble database interface has been integrated. * The user interface has been revised and improved (e.g. macro block, extended existing statistical methods)

Ask for information and a free evaluation license: MIT GmbH, Phone +49-2408 945 80, Fax +49-2408 945 82, http://www.mitgmbh.de, email: software@ mitgmbh.de

AEgis Research Announces New ACSL Distributor Bausch-Gall GmbH

AEgis Research Corporation is pleased to announce that BAUSCH-GALL GmbH has agreed to act as our ACSL software distributor in the German speaking regions of Europe.

Dr. Ingrid Bausch-Gall has worked with ACSL since 1979 by providing technical support, training and consulting services. Her impressive ACSL experience, her recognized technical excellence in simulation, along with her understanding of the European simulation market makes her the logical first choice for AEgis representative in this important technical market.

AEgis is a fast growing, high technology company started in 1988 to provide engineering services in simulation and analysis to the aerospace industry. AEgis purchased ACSL from MGA (Mitchell & Gauthier Associates) Software in September of 1998. AEgis is also the developer of HLA (High Level Architecture) Lab Works, a significant tool in the development and integration of distributed simulations used by the United States Department of Defense. We consider ACSL to be a strategic acquisition for AEgis and a significant component of our set of simulation-support products and services. We plan to use AEgis personnel, initiative and assets to aggressively advance the state of the art in continuous system simulation.

We are exceedingly fortunate to have Joseph Gauthier, one of the founders of MGA and co-author of ACSL, join AEgis Research as the ACSL Product Family Manager. Joe has clear authority for management of ACSL development and technical support. We intend to strongly support his initiatives for ACSL product evolution by making the diverse assets of AEgis Research Corporation available to him.

Contact: AEgis Research Corporation 6703 Odyssey Drive, Suite 200 Huntsville, AL 35806 U.S.A. Phone: +1-256 922-0802 Fax: +1-256 922-0904 http://www.aegisrc.com

MATLAB/Simulink Release 11

The new Release 11 CD contains the entire MathWorks product family, a total of 42 products built on the MATLAB and Simulink foundation. The CD offers 5 new products and substantial enhancements to 16 others including MATLAB 5.3 and a major new release of Simulink, version 3.0. In combination, these new products and updates make the MATLAB and Simulink environments even better for Data Analysis, Visualization, Application Development, Control Design, DSP, Communications Design and Financial Engineering.

Contact: Sven Gerber, Scientific Computers GmbH, Aachen-Muenchen-Bern, Tel.: +49-241-47075-13, Fax: +49-241-44983, email: sven@scientific.de, http:// www.scientific.de

Automatic Break Pattern Analysis of Automobile Glass

At NIWeek '98 in Austin MIT GmbH has introduced the system ABBA for break pattern analysis of windshields. The car glass producer SEKURIT SAINT GOBAIN uses ABBA worldwide in order to meet high quality standards.

For automobile glass such as windshields and window glass great demands on quality and especially safety are made. They have to fulfill certain security standards to prevent an injury in case the glass were to break. An objective quality assessment system for SEKURIT SAINT GOBAIN had to be developed. The system should make an automatic analysis of the breaking structure related to the named measures possible on the PC. Furthermore the system should be able to compensate the varied quality of blueprints and to give reliable results even with under- or overexposed blueprints. The system ABBA recognizes the marked squares automatically and counts the pieces of glass according to the European Community standard. Mostly algorithms from the area of fuzzy technologies and neural networks are used.

The system ABBA is based on the software tools LabVIEW and IMAQ Vision by National Instruments. A combination of intelligent technologies together with methods of image processing is very efficient because of the simple interplay of these tools with DataEngine V.i, a library developed by MIT GmbH which adds fuzzy technologies and neural networks to LabVIEW.

MIT GmbH, Phone +49-2408 945 80, Fax +49-2408 945 82, http://www.mitgmbh.de, email: software@ mitgmbh.de

Book Reviews

Metric Constrained Interpolation, Commutant Lifting and Systems
by C.Foias, A.E.Frazho, I.Gohberg, M.A.Kaashoek
Operator Theory: Advances and Applications 100, Birkhäuser Verlag, Basel 1998
ISBN 3-7643-5891-2

The monograph under consideration is concerned with the systematic treatment of various stationary and nonstationary interpolation problems with metric constraints based on the commutant lifting theorem from operator theory and the state space method from mathematical system theory.

These subjects belong to a very active area of research and there exists a vast literature. However, mostly the results are only available in original contributions published in research journals. Up to now a comprehensive and unified treatment of both kinds of problems by making use of the commutant lifting approach provided in a sufficiently general form has been lacking.

The present book is organized in two parts. In the first part, consisting of chapters I-VII, a general theory of interpolation problems for operator-valued functions with operator arguments is developed. It includes the treatment of operator-valued versions of a lot of classical problems, for example the left tangential Nevanlinna-Pick problem, the tangential Hermite- Fejer problem, or the Sarason problem. The presentation focuses on the question of existence of a solution, the explicit construction of the central solution and the parametrization of all solutions. The second part, consisting of chapters VIII-XIV, is concerned with the nonstationary analogues of the interpolation problems considered before. It employs two methods; one is to reduce to time-variant problems, the other uses the three chains completion theorem. As an application some results on time-variant control problems are given. The book concludes with an appendix on factorization of matrix-valued functions.

It has to be pointed out that this volume provides a self-contained, detailed and well written treatment of the mentioned subjects. Therefore it might not only be of good use for research workers in mathematics and applied sciences, but also be most valuable for the lecturer preparing courses on these topics or for the graduate student to get a profound knowledge and to be led to the front of research.

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Recent progress in Operator Theory
by I.Gohberg, R.Mennicken, C.Tretter (editors)
Operator Theory: Advances and Applications 103, Birkhäuser Verlag, Basel 1998
ISBN 3-7643-5891-2

The volume OT 103, Recent progress in operator theory, covers a part of the material presented at the IWOTA 95, Regensburg. It is organized as a collection of up-to-date research articles.

The leading subjects of this particular IWOTA-conference (1995 International Workshop on Operator Theory and Applications, 8th in this series) were aspects of linear and nonlinear spectral problems and operator theory in spaces with an indefinite metric. The present volume is mainly concerned with operator theory, its applications to interpolation and extension problems, and abstract spectral theory. Those articles treating the spectral theory of specific operators are collected in a separate volume entitled Differential and Integral Operators (Operator Theory: Advances and Applications 102).

Most articles are written on a high level leading the reader to the front of research. Therefore they will be mainly used by workers in the field. Nevertheless, some of the collected papers, although definitely good research work, are concerning the style of exposition more detailed and could therefore also be used as a guide into particular subjects for a graduate student or young researcher, for example preparing for his PhD. In this respect one could mention the articles by T.Azizov, A.Dijksma, by D.Gaspar, N.Sucia, by A.Gheondea, or by S.Hassi, M.Kaltenbäck, H.deSnoo.

Last but not least the volume contains a list of participants, a brief sketch of the history of the IWOTA-conferences and a photo of the participants.

Together with its above mentioned companion (OT 102, Differential and Integral Operators) this book is a most valuable collection of research articles. Due to the wide range of applications of the treated subjects, for example in mathematical physics, hydrodynamics, quantum mechanics, as well as in the theory of networks and systems, it probably will be of good use to a large readership composed of pure and applied mathematicians, as well as physicists and engineers.

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Harmonic Analysis on the Heisenberg Group
by Sundaram Thangavelu
Progress in Mathematics, Vol. 159, Birkhäuser, Boston - Basel - Berlin 1998
ISBN 0-8176-4050-9

This monograph is concerned with various aspects of harmonic analysis on the Heisenberg group, which plays an important role in several branches of mathematics, such as representation theory, partial differential equations, number theory, several complex variables, and quantum mechanics.

The Heisenberg group is a well known and thoroughly investigated example of a nilpotent Lie group. As it is also the "most commutative" among the non-commutative Lie groups, it offers the greatest opportunity for generalizing the remarkable results of Euclidean analysis. In the book under consideration it is demonstrated how the standard results of abelian harmonic analysis, such as Plancherel and Paley-Wiener theorems, Wiener-Tauberian theorems, Bochner-Riesz means and multipliers for the Fourier transform, take shape in the non-abelian setup of the Heisenberg group.

The book is divided into four chapters. The first chapter deals with basic results about the representations of the Heisenberg group and the Fourier and Weyl transforms. The beautiful interplay between the representation theory of the Heisenberg group and the classical expansions in terms of

Hermite and Laguerre functions is demonstrated. In the second chapter the author develops the spectral theory of the sublaplacian. Abel summability of expansions of functions in terms of the special Hermite functions is proved. This can be interpreted as a type of Peter-Weyl theorem for the Heisenberg group. The algebra of radial functions on the Heisenberg group is considered in chapter three. Also the Gelfand transform on this algebra and some applications are studied. In the last chapter, the reduced Heisenberg group is investigated and some of the theorems treated in the previous chapters are improved in that context.

Thangavelu's exposition is clear, well developed and written on a high level. The reader is assumed to possess a profound knowledge on Euclidean harmonic analysis. Also it proofs useful to be familiar with the basic theory of the Heisenberg group. Several results appear for the first time in book form; some theorems have not even appeared elsewhere. This monograph will be of good use for research workers.

M. Langer, TU Vienna

Differential and Integral Operators
Operator Theory: Advances and Applications, Vol. 102, Birkhäuser, Basel - Boston - Berlin 1998
ISBN 3-7643-5890-4

This volume is the second part of the proceedings of the IWOTA 95, which was held at the University of Regensburg, Germany, the eighth workshop in the series of IWOTA (International Workshops on Operator Theory and Applications). The main topics of this conference were linear and nonlinear spectral problems for abstract operators and ordinary and partial operators, pseudo differential operators, and integral operators. But the conference was also focussed on operator theory in spaces with indefinite metric, operator functions, interpolation and extension problems. Applications to mathematical physics, hydrodynamics, magnetohydrodynamics, quantum mechanics, astrophysics and the theory of networks and systems were treated.

This volume contains the contributions dedicated to the theory of differential and integral operators. The contributions concerning the other topics of this conference are collected in a separate volume entitled "Recent Progress in Operator Theory" (Operator Theory: Advances and Applications 103).

The articles are written on a high level, as usual in scientific journals, and will therefore mainly be used by workers in the field. Nevertheless a large part of the presented work also features applications to various branches of physics and engineering sciences. In particular I would like to refer in this respect to the articles: "Limit behaviour in a singular perturbation problem, regularized convolution operators and the three-body quantum problem", "A nonlinear spectral problem with periodic coefficients occurring in magnetohydrodynamics", "An evolutionary problem of a flow of a nonlinear viscous fluid in a deformable viscoelastic tube", and "Quantum compound Poisson processes and white noise analysis".

Altogether the present volume contains a collection of articles which should proof most valuable for pure and applied mathematicians as well as theoretical physicists and engineers.

M. Langer, TU Vienna

Variational Calculus, Optimal Control and Applications
Schmidt W.H., Heier K., Bittner L., Bulirsch R. (ed.)
International Series of Numerical Mathematics, Vol. 124, Birkhäuser Basel, 1998
ISBN 3-7643-5906-4, 340 + xviii pages

The publication contains contributions presented at the 12th conference related to the topic above which took place Sept. 23-27, 1996, in Trassenheide, Usedom island. It addresses four problem complexes which are mostly motivated by practical problems, usually arising from questions of flight dynamics.

Existence theory and optimality conditions needed for the justification of numerical algorithms are the contents of the first chapter. The second chapter presents the analysis and syntheses of control systems and dynamic programming featuring an interpretation of the solved Hamilton- Jacobi-Bellman equation, sensitivity analysis of stiff and non-stiff initial value problems and real time/feedback control. The third complex deals with recent advances in the field of numerical methods and their applications to fluid dynamics and flight path optimisation utilising nonlinear programming techniques, accelerated multiple shooting, homotopy and SQP methods. A wide variety of applications to mechanical and aerospace systems, such as fluid waves and transport, space flight problems or geometrical extremal problems, concludes volume 124.

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Nonlinear Partial Differential Equations for Scientists and Engineers
Debnath L.
Birkhäuser Boston, 1997
ISBN 0-8176-3902-0, 593 + xvii pages

The goal of this book is to provide the reader a comprehensive overview to analytical solution tools for PDEs of nonlinear type using various examples of problems arising in modern physics for illustration. It is suitable as a reference guide for scientists of all kind getting in touch with the subject as well as a textbook for students.

The first of twelve chapters presents a classification of linear PDEs and provides some fundamental solution techniques. For reasons of accuracy and distinctness, it is also recommended to the interested reader not being familiar with basics like the Method of Characteristics, transformations and Green's functions.

In the following chapter, one presents various nonlinear equations ranging from the basic kinematic wave equation to the nonlinear Schrödinger equation and complex field equations which are indeed the pulse of modern physics (the latter are not treated analytically). After a brief theoretical discussion of Variational Principles and the Method of Characteristics, one goes straight to concrete problems. From there on, the following text proceeds with a chapter-wise presentation and solution of equations too numerous to enumerate all of them. It is important to mention that each chapter intents to treat a specific physical subject and that particular mathematical solution tools are provided and developed only where needed: For example, the topic of shock waves requires the

introduction of generalised solutions; the theme of solitons leads to application of Lie-Group/AKNS methods and specific transformations.

Each chapter is completed by well-selected exercises. Solutions or at least hints are given to the most relevant of them in an appendix. The author's work is recommendable to anyone interested in nonlinear PDEs.

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***Programmierung für Mathematiker und Naturwissenschaftler* (in German)**
Eine pragmatische Einführung mit C++
Vdf-Verlag, ISBN 3 7281 2407 9

The author provides a gentle introduction how to program a computer, assuming no initial knowledge. Using the C++ programming language, the basic datatypes or operators are explained. Further user defined data types like objects and subroutines become established. Ongoing the author tries to present practical applications according every new introduced convention. Reached chapter 5 the reader also gets knowledge about fundamental algorithms and applied structures for well kown problems. Therefore enhanced features, like pointers, dynamic data structures or inheritance are introduced. Finally a short discussion about run-time analysis offers the reader a view how to evaluate performance and efficency of own implementations.

The book delivers an excellent basis for both become familar with the art of computer programming and learning C++, actually the prime programming language. The major advantage of this work is that also data structures and according algorithms are presented. That advises the book for courses or self studies. The excercises at the end of each chapter support this intentions.

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Simulation mit ACSL
***Grundlagen und Anwendungen* (in German)**
Alexander Karvas / Andreas Mohn / Dirk Kamp
VDE-Verlag, Berlin, 1996
ISBN 3-8007-1957-6, 314 Seiten

This book gives a brief introduction to the theory of simulation and presents the simulation software ACSL. After the description of basic ACSL concepts the reader is guided by some simple examples. Here the authors use a 'theory-first practice-later' approach. A good listing of ACSL commands, variables and syntax error messages with short descriptions is added.

The part about the mathematical background of simulation concentrates on integration algorithms, the implementation of analogue systems, Laplace- Transformation and the modelling of controllers. It is rather a summary for engineers than an introduction for beginners. Unfortunately the connections to simulation are sometimes not worked out.

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Deterministic Scheduling Theory
R. Gary Parker
Chapman & Hall, 1995
ISBN 0-412-99681-2, 290 pages

"This is a book about scheduling. In fact, it is really a book about what I know about scheduling, and even then, the choice of topics and the manner in which they are presented is very much a function of my own taste, interest and understanding of the subject has developed over some twenty-five years." In the preface of the book, the author gives quite a good characterization of his book. His experience with and insight in this field are really impressive. He shares some of his insights with the reader in chapter 1 (Introduction) and gives a good overview over the mathematical preliminaries in chapter 2.

Chapter 3 starts in rather standard fashion with single processor problems. In chapter 4 parallel processor models are considered, while in chapter 5 flow shop, job shop, and more general models are examined. Scheduling problems that in some sense tend to resist our convenient classification format are addressed in chapter 6, which includes models of the classroom scheduling problem described earlier, staffing or workforce scheduling problems, and last, timetabling problems. Chapter 7 takes up issues in the area of project scheduling. Topics included are ones related to issues in activity network construction, basic scheduling calculations, and problems of time-cost optimization. Finally, chapter 8 deals with traversals. Considered are Eulerian and Hamiltonian traversals and their practical manifestations in the form of the Chinese postman and travelling salesman problems.

While the first two chapters give a very good insight to the kind of the problems discussed in this book even to unexperienced readers, any readers who want to understand the rest of the book must already have experience in this field at least comparable to the author's. The reason is the heavy formalism that is used to present the problems there. It may be easy for the author who has worked in this field for 25 years, but newcomers might only be repelled from the subject by this book.

So this book may be recommended to experts in scheduling theory who want to read about a special aspect which they have not yet explored. The first two chapters may also be used as a guide into the subject for newcomers.

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Harmonic Analysis and Hypergroups
by K.A. Ross, J.M. Anderson, G.L. Litvinov, A.I. Singh, V.S. Sunder, N.J. Wildberger (editors)
Trends in Mathematics, Birkhäuser Boston, 1998

The present volume is a collection of papers which report on lectures which were held during an International Conference on Harmonic Analysis which took place at the University of Dehli, India, from December 18 to 22, 1995. An underlying theme of the conference and the articles in the volume was hypergroups, the theory of which has developed and been found useful in fields as diverse as special functions, differential equations, probability theory, representation theory, measure theory, Hopf algebras and quantum groups. Some other areas of emphasis that emerged were harmonic analysis of analytic functions, ergodic theory and wavelets.

Most articles are written on a high level leading the reader to the front of research. The volume also includes an interesting survey article introducing the basic concepts of hypergroups such as "Three lectures on Hypergroups" by Alan L. Schwartz. Let me also give a selection of other articles in the present volume: "Wavelets on Hypergroups" by K. Trimeche, "Semigroups of Positive Definite Functions and Related Topics" by Martin E. Walter, "Hypergroups and Signed Hypergroups" by Kenneth A. Ross, "Multipliers of de Branges-Rovnyak spaces II" by Benjamin A. Lotto and Donald Sarason.

To sum up one can say that "Harmonic Analysis and Hypergroups" contains very interesting papers for researchers and graduate students working in the field of harmonic analysis and related topics.

M. Kaltenbäck, TU Vienna

Minimum Entropy Control for Time-Varying Systems
M.A. Peters / P. Iglesias
Birkhäuser, Boston, 1997
ISBN 3-7643-3972-1, 200 pages

Based on results of minimum entropy control for linear time-invariant systems, a time-domain theory of the entropy criterion is developed.

It is known that controllers satisfying a closed-loop minimum entropy condition have considerable advantages over other optimal controllers. Guaranteeing an H norm bound , the entropy is an upper bound for the H2 norm of the systems, thus such controllers reach a higher performance. These qualities were now extended to controllers for time varying systems.

The book is built upon the definition of entropy introduced by Iglesias, then it is slightly modified such that it is consistent with that used for time-invariant systems. Properties of that entropy are then investigated, in particular its relationship with optimal control problems. Finally the minimal entropy control problem for systems admitting a state-space realisation is solved.

The first two chapters of the book state the problem and define the class of systems that will be considered (discrete-time time-varying systems). These systems are represented using infinite-dimensional operators. Chapter three presents induced operator norms, their usage and qualities for the considered class of systems. Chapter four focuses on the entropy itself: definition and properties are given and an extension to non-linear systems is considered. In chapter five connections with optimal control problems are discussed and the relationship between the entropy of a causal system and the entropy of its anti-causal adjoint is used to compare the entropy operator and a related risk-sensitive cost function. In chapter six the problem of finding a controller which minimises the entropy of the closed-loop input-output operator for discrete-time time-varying systems is posed and the problem is then solved via a separation principle. Finally in chapter seven a definition of the entropy for time-varying continuous-time systems is presented.

This work arose as part of the first author's doctoral dissertation and is aimed at researchers in mathematical control theory. Hence a fundamental basis in control theory is essential for understanding the book.

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Systems and Control in the Twenty-First Century
by C.I. Byrnes, B.N. Datta, C.F. Martin,
D.S. Gilliam (editors)
Progress in Systems and Control Theory 22,
Birkhäuser Boston, 1997

This volume contains articles which are among those presented as plenary addresses, invited addresses and mini symposia at the 12th International Symposium on the Mathematical Theory of Networks and Systems held in St. Louis, Missouri from June 24 - 28, 1996.

The articles report on the work of leading researchers who are on the vanguard of the development of systems, control and estimation for the next century. The book includes new methodologies in distributed parameter systems, linear, nonlinear and stochastic systems, and numerical and pure mathematics for solving problems in areas such as aircraft design, circuit simulation, imaging, speech synthesis, and visionics. I would like to refer to a selection of papers in this volume. "State Space Method for Inverse Spectral Problems" by D. Alpay and I. Gohberg, "Modelling Methodology for Elastomer Dynamics" by H.T. Banks and Nancy Lybeck, "Numerical Methods for Linear Control Systems" by D. Boley and B.N. Datta, "On Duality between Filtering and Interpolation" by C.I. Byrnes and A. Lindquist, "Fighter Aircraft Control Challenges and Technology Transition" by K.A. Wise.

Most articles are written on a high level leading the reader to the front of research. Therefore they will be mainly used by workers in the field. Nevertheless, some of the collected papers are written in an expository style, and could therefore be used as a guide into particular subjects for graduate students and for mathematicians with an interest in the analysis, design and synthesis of circuits and systems.

M. Kaltenbäck, TU Vienna

Werkzeuge für die Modellierung und Simulation im Umweltbereich **(in German)**
ASIM-Mitteilungen 61**, Edited by R.Grützner, J.Benz**
Metropolis Verlag, 1998
ISBN 3-89518-218-4, 213 pages

The book collects papers of the 8th workshop about tools for modelling and simulation in environmental applications, held in March 1998 in Witzenhausen, Germany.

A short introduction by the editor describes the reasons and possibilities of simulation in environmental applications. Then 13 papers, each 15-20 pages of length, present the latest research and developments in the field of environmental computer sciences. The book is divided into 4 parts of the following subjects:

1. Fundamentals and tools: 2 articles describe not only the mathematical foundations of consumption of natural resources but also an approach to individual oriented models.

2. Connection of systems for simulation and information: Two articles; one paper about the documentation of environmental models, the other about the connection between geo-information systems and simulation.

3. Methods: In this part 6 articles describe different simulation techniques, containing fuzzy inductive reasoning, wavelet analysis, "case sensitive" simulation, models of individuals with different behaviour, object oriented modelling and parallel discrete event simulation.

4. Applications: The first paper in this section deals with controlling in production, the other two with modelling of aquatic system, one of them using MATLAB tool boxes, the other one neural networks.

As it is not the main issue of a workshop report to present theoretical foundations, the book is the best it can be: A presentation of a representative selection of papers dealing with todays solutions and methods in environmental modelling an simulation.

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Control and Estimation of Distributed Parameter Systems
Desch W., Kappel F., Kunisch K. (ed.)
International Series of Numerical Mathematics, Vol. 126, Birkhäuser Basel, 1998
ISBN 3-7643-5835-1, 310 + x pages

Volume 126 of the ISNM-series resulted from the seventh conference related to the topic held in Vorau, Austria, July 14-20, 1996. It consists of 23 contributions and offers insight to the state-of-the-art of current research in control and estimation of partial differential equations. Some topics included are dealing with:
Control and stability of linear and nonlinear hyperbolic systems related to elasticity,
Exact and approximate controllability/observability,
Dynamic programming for PDEs and Pontryagin's maximum principle,
Applying numerics to optimal and suboptimal control problems.

The book is of use for any control theorist seeking information on the latest developments but is also recommended to any researcher who is interested in getting an insight to that expanding area of applied mathematics.

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Fuzzy Systems Design: Social and Engineering Applications
L. Reznik, V. Dimitrov, J. Kacprzyk
Physica-Verlag, Heidelberg New York, 1998
ISBN 3-7908-1118-1, 334 pp.

The only thing of which we can be certain is that uncertainty is the rule and certainty is the exception: "At the still point of the turning world. Neither flesh nor fleshless; Neither from nor towards; at the sill point, there the dance is, but neither arrest nor movement. And do not call it fixity ..." (T. S. Eliot).

Well, don't be afraid! That book seriously is a delight for both mathematicians and philosophers in the field. As part of a series dealing with studies in the field of fuzziness and soft computing in general, it is a collection of papers covering the main aspects fuzzy systems design. On the basis of an introduction on philosophical background and mathematical basics of fuzzy systems design, different aspects of their application in both social and engineering fields are discussed.

The book somehow states an attempt to open the mind for different ways of considering problems. In that way it tries to act as a bridge between both the universes of university research and applications as well as the distinct fields of fuzziness in social and engineering applications. The book includes papers on multi-criteria optimization in general, on philosophical and mathematical models of the dynamics of social organizations, human decision making, managing and leadership, and the application of these principals for further development to fuzzy models. The engineering applications include papers on various aspects of fuzzy controller design, on the use of fuzziness for adaptive systems, on applications for controllers for manufacturing processes, for cellular mobile communication networks, etc. A book to spend your time with.

The book is published as part of a series of publications of mostly monographs, textbooks and edited volumes, but also proceedings of important conferences, symposia and congresses. The aim is to cover significant recent developments in the field, both of foundational and applicational character.

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Basic Model Theory
K. Doets
CSLI Publications, Stanford, California, 1996
ISBN 1-57586-048-1, 130 pp.

Model theory investigates the relationships between mathematical structures, represented in models, and the ways of their description in formal languages. The book emphasizes on first-order model theory, as for such applications describing languages are best known.

After a brief recall of basic notions of first-order model theory for terms, formulas, sentences and models, etc., relations between models are discussed. They represent a certain vocabulary of tools by means of which models can be compared. The use of these tools of first-order theory is explained on the example of Ehrenfeucht-Fraissé games. The systematic of model generation and construction is built up on these preliminaries. The ruling concept for first-order theory in such a construction process is contained in the compactness theorem: A set of sentences is satisfiable if it has a model; it is finitely satisfiable if all its finite subsets are satisfiable. Setting up on this examples of more or less complex systems are derived and explained. Appendices on the more general matters of deduction and completeness and of set theory complete the book. Each chapter is concluded by a section of tasks that aim to recall what the previous was about and how it is in particularly realized.

Although the book is meant as an introduction to the basics of model theory and to the world of its notions the reader is expected to have some "working knowledge" of propositional and first-order logic. In order to fulfill expectations of a promised brief overview the contents have to be stated in a therefor very dense form. The book is written in rather mathematical terms with very few easy to read sections. For readers not familiar with theoretical mathematics notations the book might not be the best choice for a first contact with the matter of model theory. Although it actually does take some staying power to work oneself through it, the matter still is worth it.

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News on Books and Journals

Simulation Practice and Theory

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

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

Forthcoming papers SIMPRA (status Jan 30, 1999):

A.A. Bahnasawi A switching models gain rotation algorithm for tracking a maneuvring target

T.S. Meinert, G.D. Taylor, J.R. English A modular simulation approach for automated material handling systems

P. Linardis, I. Vlahavas PARCIS: A ROBUST parallel VLSI circuit simulator

L.E. Mellott, M.W. Berry, E.J. Comisky, L.J. Cross The design and implementation of an individual-based predator-prey model for a distributed computing environment

Bor-Yuh Leu, Fu-Kwun Wang A simulation study of sequencing heuristics in a cellular flexible assembly system with hybrid order shipment environments

D. Bruno, A. Leonardi Nonlinear structural models in cableway transport systems

J. Nikoukaran, R.J. Paul Software selection for simulation in manufacturing: a review

A.S. Alekseev, B.G. Mikhailenko Mathematical models of elastic wave processes in seismology and seismic prospecting: forward and inverse problems

F. Quaglia, B. Ciciani Performance vs. cost of redundant arrays of inexpensive disks

K. Cosic, I. Kopriva, T. Kostic, M. Slamic, M. Volarevic Design and implementation of a hardware-in-the-loop simulator for a semi-automatic guided missile system

J. Nikoukaran, V. Hlupic, R.J. Paul A hierarchical framework for evaluating simulation software

Changpeng Fan A simulation study of soft real-time scheduling and handling schemes for multimedia support

U. Crisalli User's behaviour simulation of intercity rail service choices

Xin Liao, Xian-He Sun Computer simulation of PEC network

G. Marocco, F. Bardati BEST: a finite difference simulator for time electromagnetics

New Books

New books in the series "Studies in Fuzziness and Soft Computing", published by the Springer-Verlag group (Physica-Verlag, Heidelberg and New York), edited by Janusz Kacprzyk, Systems Research Institute, Polish Academy of Sciences, ul. Newelska 6, PL-01-447 Warsaw, email: kacprzyk@ibspan.waw.pl, Tel: 48-22 36 44 14 36 81 50, Fax: +48-22 37 27 72

J.N. Mordeson and P.S. Nair "Fuzzy mathematics: An introduction for engineers and scientists" 1998, 258 pp. ISBN 3-7908-1121-1

L.C. Jain and T. Fukuda (Eds.) "Soft computing for intelligent robotic systems" 1999, 231 pp. ISBN 3-7908-1147-5

J. Cardoso and H. Camargo (Eds.) "Fuzziness in Petri nets" 1999, 318 pp. ISBN 3-7908-1158-0

P.S. Szczepaniak (Ed.) "Computational intelligence and applications" 1999, 369 pp. ISBN 3-7908-1161-8

E. Orlowska (Ed.) "Logic at work" 1999, 694 pp. ISBN 3-7908-1164-5

J.J. Buckley and T. Feuring "Fuzzy and neural: Interactions and applications" 1999, 160 pp. ISBN 3-7908-1170-X

A. Yazici and R. George "Fuzzy database modeling" 1999, 234 pp. ISBN 3-7908-1171-8

M. Zaus "Crisp and soft computing with hypercubical calculus: New approaches to modelling in cognitive science and technology..."

R.A. Ribeiro, H.-J. Zimmermann, R.R. Yager and J. Kacprzyk (Eds.) "Soft computing in financial engineering" 1999, 506 pp. ISBN 3-7908-1173-4

For more information on these and previous books and volumes see the WWW page of the series: http://www.springer.de/cgi-bin/search_book.pl?series=2941

Calendar of Events

March 1999

14-16 **ASIM Workshop "Werkzeuge für Modellbildung und Simulation in Umweltanwendungen"**. Koblenz
Contact: Prof.Dr.habil. Rolf Grützner, Universität Rostock, FB Informatik, Albert-Einstein-Str. 21, D-18051 Rostock, Tel.: +49-381-498 3369, Fax: +49-381-498 3426, email: gruet@informatik.uni-rostock.de, WWW: http://www.informatik.uni-rostock.de/FB/Praktik/Mosi/ak5/ak_info.html

21-24 **Simulation Solutions 99 Conference**. Mesa, Arizona
Contact: IIEs Member and Customer Service, Tel.: +1-800-494-0460, email: cs@www.iienet.org, WWW: http://www.iienet.org/SimSol99.htm

April 1999

7-9 **UK Sim 99.** Fourth United Kingdom Simulation Society Conference. Cambridge, U.K.
Contact: Prof. Russell Cheng, Canterbury Business School, The University, GB-Canterbury, Kent CT2 7PE, Tel.: +44-1227-823665, Fax: +44-1227-761187, email: R.C.H.cheng@ukc.ac.uk, http://www.doc.ntu.ac.uk/uksim/

12-13 **13. Workshop GI-FG 4.5.3 "KI-Methoden in der simulationsbasierten Optimierung"**. Chemnitz, Germany
Contact: Prof. Helena Szczerbicka, Universität Bremen, Rechnerarchitektur und Modellierung, D-28334 Bremen, email: helena@informatik.uni-bremen.de, WWW: http://www.tu-chemnitz.de/~jflo/ModSim/ASIM/

13 **DBSS Workshop Simulation of business economical models**. Rotterdam
Contact: H. de Swaan Arons, Tel.: +31-10 4081813, email: deswaanarons@few.eur.nl

20-22 **BioMedSim99.** 1st Conference on Modelling and Simulation in Biology, Medicine and Biomedical Engineering. Noisy-le-Grand, France
Contact: Prof. Dr. Yskandar Hamam, ESIEE, Computer Control Laboratory, 2 Bld Blaise Pascal, F-93162 Noisy le Grand, Tel.: +33-1 45 92 66 11, Fax: +33-1 45 92 66 99, WWW: http://www.esiee.fr/~hamamy/bioconf.html

21-23 **ECEC99.** 6th European Concurrent Engineering Conference. Erlangen-Nuremberg, Germany
Contact: Philippe Geril, SCS Europe, c/o University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: Philippe.Geril@rug.ac.be, WWW: http://hobbes.rug.ac.be/~scs

25-28 **EUROMEDIA99.** Munich, Germany
Contact: Philippe Geril, SCS Europe, c/o University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: Philippe.Geril@rug.ac.be, WWW: http://hobbes.rug.ac.be/~scs

27-29 **MOSIS99.** 33th Intl. Conf. on Modelling and Simulation of Systems. Roznov, Czech rep.
Contact: Jan Stefan, FEI -VSB TU, Ostrava, tr. 17. listopadu, CZ-70833 Ostrava Poruba, email: Jan Stefan@vsb.cz

May 1999

5-8 **IASTED International Conference Modelling and Simulation 1999.** Philadelphia, PA USA
Contact: IASTED Secretariat, MS99, 1811 west Katella Avenue, Suite 101, Anaheim, CA USA 92804, Tel.: +1-800-995-2161, Fax: +1-714-778-5463, email: iasted@iasted.com, WWW: http://www.iasted.com

27-28 **ZEL99.** Railways on the edge of third millennium. Zilina, Slovak rep.
Contact: Prof. L. Skyva, University of Zilina, Velky Diel, SK-01026 Zilina

June 1999

1-4 **ESM99.** European Simulation Multiconference. Warsaw, Poland
Contact: Philippe Geril, SCS Europe, c/o University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: Philippe.Geril@rug.ac.be, http://hobbes.rug.ac.be/~scs

15-18 **ITI'99.** 21st Int. Conference Information Technology Interfaces. Pula, Croatia
Contact: ITI99, Sveucilisni Racunski Centar, University Computing Centre, P.O.Box 741, Josipa Marohnica bb, HR-10000 Zagreb, Croatia, Tel.: +385-1-616 55 99, Fax: +385-1-616 55 91, email: iti@srce.hr, WWW: http://www.srce.hr/iti/

July 1999

2 **DBSS Symposium Ethical Issues in Modelling and Simulation**.
Contact: Dr. D.L. Kettenis, Computer Science Group, Dreijenplein 2, NL-6703 HB Wageningen, Tel.: +31-317 483773, email: Dik.Kettenis@users.info.wau.nl

August 1999

25-27 **6th PCSC Workshop on Simulation in Research and Development**. Bialystok, Poland
Contact: Prof. L. Bobrowski, email: ptsk99@ii.pb.bialystok.pl

29-31 **Intl. Workshop on Advanced Simulation and AI**. Bucharest, Rumania
Contact: Philippe Geril, SCS Europe, c/o University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: Philippe.Geril@rug.ac.be, http://hobbes.rug.ac.be/~scs

31-September 3
ECC 99. European Control Conference. Karlsruhe, Germany
Contact: Prof. Paul M. Frank, Gerhard-Mercator-Universität, GH Duisburg, FG Mess- u. Regelungstechnik, Bismarckstr 81, D-47048 Duisburg, Tel.: +49 211 6214 224, Fax: +49 211 6214 161, email: gma@vdi.de, WWW: http://ecc99.uni-duisburg.de

September 1999

1-3 **IASTED AMS 99.** Intl Conf. on Applied Modelling & Simulation. Cairns, Australia
Contact: IASTED Secretariat AMS99, #80, 4500 - 16 Avenue NW, Calgary AB T3B 0M6, Canada, email: calgary@iasted.com, WWW: http://www.iasted.com/

6-10 **PaCT-99.** 5th Intl. Conference Parallel Computing Technologies. St. Petersburg, Russia
Contact: http://www.pact.sscc.ru/conference/pact99/

13-16 **EUFIT.** 7th European Congress on Intelligent Techniques and Soft Computing. Aachen, Germany
Contact: EUFIT99, c/o ELITE Foundation, Promenade 9, D-52076 Aachen, Tel.: +49-2408 6969, Fax: +49-2408 94582, email: eufit@mitgmbh.de

14-16 **ASIS99.** 21st Intl. Workshop Advanced Simulation Systems. Krnov, Czech rep.
Contact: Jan Stefan, FEI -VSB TU, Ostrava, tr. 17. listopadu, CZ-70833 Ostrava Poruba, email: Jan Stefan@vsb.cz

16-18 **HMS-1999.** Intl. Workshop on Harbour, Maritime & Logistics Modelling and Simulation. Genoa, Italy
Contact: Philippe Geril, SCS Europe, c/o University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: Philippe.Geril@rug.ac.be, http://hobbes.rug.ac.be/~scs

21-24 **ASIM99.** *13. Symposium Simulationstechnik*. Weimar
Contact: Dipl.-L. Christine Rieger, Bauhaus-Universität Weimar, Coudraystraße 13, D-99421 Weimar, Tel.: +49-3643-584251, Fax: +49-3643-584280, email: christine.rieger@uni-weimar.de, WWW: http://www.uni-weimar.de/veranst/asim.html

October 1999

5-7 **MOSMIC99.** 3rd Intl. Workshop Modelling and Simulation in Management Informatics and Control. Zilina
Contact: Prof. Mikulas Alexik, University of Zilina, Dept. Technical Cybernetics, Velky Diel, SK-01026 Zilina, Tel.: +42-189-54-042, Fax: +42-189-54-806, email: alexik@frtk.utc.sk

6-8 **MOSIM99.** The Second French Conference on MOdelling and SIMulation. Annecy, France
Contact: Georges Habchi, LLP/CESALP-ESIA, 41, avenue de la Plaine, F-74016 Annecy Cedex, Tel.: +33-4 50 66 60 80, Fax: +33-4 50 66 60 20, mosim99@esia.univ-savoie.fr, WWW: http://www.univ-savoie.fr/mosim99/

19-21 **BICSC99.** 4th Beijing International Conference on System Simulation and Scientific Computing. Beijing, China
Contact: Yang Yawei, Beijing University of Aeronautics and Astronautics, Dept. of Automatic Control, email: yyw@ns.dept3.buaa.edu.cn, WWW: http://ns.dept3.buaa.edu.cn/bicsc/bicsc99.htm

24-27 **ESS 99.** 11th European Simulation Symposium and Exhibition / Simulation in Industry. Erlangen-Nuremberg, Germany
Contact: Philippe Geril, SCS European Simulation Office, University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: Philippe.Geril@rug.ac.be, http://hobbes.rug.ac.be/~scs

December 1999

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

February 2000

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

March 2000

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

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

April 2000

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

August 2000

21-25 **IMACS Congress 2000.** 16th IMACS World Congress. Lausanne, Switzerland
Contact: IMACS Secretariat, , email: imacs@cs.rutgers.edu, WWW: http://www.cs.rutgers.edu/imacs/

September 2000

18-23 **ASIM / ESS2000.** *14. Symposium Simulationstechni*k and European Simulation Symposium. Hamburg, Germany
Contact: Prof.Dr. Dietmar P.F. Möller, Universität Hamburg, Inst. f. Informatik, Vogt-Kölln-Strasse 30, D-22527 Hamburg, Tel.: +49-40-, Fax: +49-40-5494 2206, email: moeller@informatik.uni-hamburg.de

June 2001

26-30 **EUROSIM2001.** European Simulation Congress. Delft
Contact: Mrs. T. Tianova, Delft University of Technology, Faculty of Information Technology and Systems, P.O. Box 5031, NL-2600 GA Delft, Fax: +31-15-2787209, email: eurosim2001@pa.twi.tudelft.nl

Aims and Scope

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

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

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

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

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

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

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The photo shows some of them, from left to right: E. Wibmer (online service at WWW server, comparisons), S. Wassertheurer (system administrator, WWW server, online database), K. Seits (organisation seminars, comparisons), J. Scheikl (organisation seminars, MATLAB support TU Vienna, comparisons), A. Pelikan (organisation seminars), C. Almeder (symbolic software support TU Vienna, comparisons), F. Breitenecker, M. Holzinger (organisation seminars, parallel comparisons), B. Bracio (guest, soft computing), M. Lingl (comparisons, evaluation comparisons, seminars), C. Kiss (database administrator, seminars).

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