

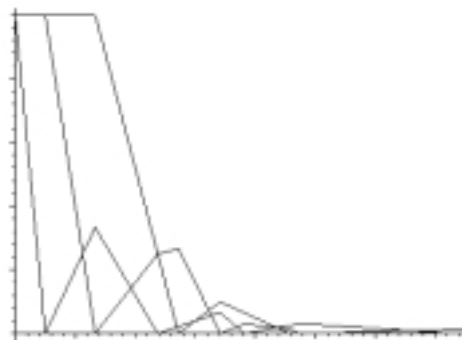
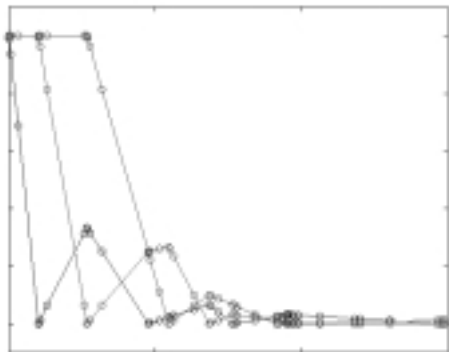
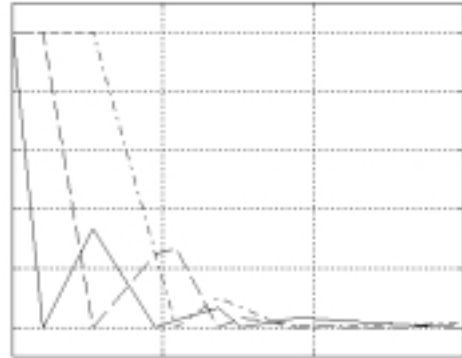
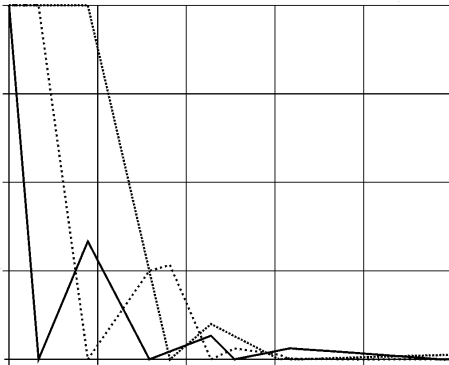
EUROSIM



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SIMULATION NEWS EUROPE

OFFICIAL NEWS JOURNAL FOR MEMBERS OF EUROSIM SOCIETIES + + + OFFICIAL NEWS JOURNAL FOR MEMBERS OF SCS EUROPE + + + A EUROSIM PUBLICATION + + + OFFICIAL NEWS JOURNAL FOR MEMBERS OF EUROSIM SOCIETIES + + + OFFICIAL NEWS JOURNAL FOR MEMBERS OF SCS EUROPE



Number 28

March / April 2000

A EUROPEAN FORUM ON SIMULATION ACTIVITIES

AN **ARGESIM** PUBLICATION

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Editorial

The first issue of Simulation News Europe in the year 2000 continues the usual structure of information on simulation related items as in the previous years. There will be a slight change in the publication schedule. Due to organisational reasons and because of deadlines on the side of the societies future issues will appear in April, August, and December each year.

We would like to point out the essay on a System Dynamics model for Latvian Rural Communities, a contribution which won a best poster award at the 3rd Mathmod conference in Vienna in February.

Solutions to Comparisons of Simulation Tools and Simulation Technique will soon reach a total of 200 published since 1991. We especially thank the authors from TU Clausthal who solved comparison 3 and 5 (some more are in preparation). There are new solutions to the latest comparison, C12. This comparison addresses continuous as well as discrete simulators, and for the next issue solutions with discrete simulators are announced. The title page shows the resulting graphs for the distance functions of the up to now 4 solutions available for C12 – the graphs coincide, as can be seen easily.

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

F. Breiteneker, I. Husinsky

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Deadline for the next issue will be July 7, 2000

Dynamic Modelling Approach for Latvian Rural Communities

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National and international authorities must make difficult policy decisions regarding socio-economic problems, which are complex, highly interrelated, and subject to uncertainty and external disturbances. Analytical and simulation models have proven useful in helping decision-makers to understand the processes involved in these complex problem/policy contexts.

The aim of this study is to investigate the behaviour of communities, the factors that influence changes in this system and these changes under different local government and state policies. The community system is complex and its state today depends on yesterday's policies. It is obvious that not all well-thought policies reach the goal. In fact – most of them do not bring desired changes and some of them even make the situation worse.

Latvia's sore point is its rural regions. Young and educated people are leaving their villages and are moving to urban regions. Rural areas become older, land is abandoned and on the other hand unemployment rises. To show these dependencies and cases the theory of Systems Thinking and System Dynamics is used. A community, as an organisational system, is characterised by its purposeful activities. Its optimal work can be guaranteed only by a systematic approach to all the problems to solve.

The methodology of System Dynamics uses computer simulation models to relate the structure of a system to its behaviour over time. It is a non-linear, dynamic, feedback-based technique that is able to portray system behaviour as it actually occurs – i.e., in disequilibrium, with decisions being made by imperfect humans using imperfect information. System dynamics models are powerful tools to help understand and leverage the feedback interrelationships of complex management systems. The models offer an operational methodology to support decision making. Decision makers can use the models to test "what-if" scenarios and explore what might have happened – or what could happen – under a variety of different past and future assumptions and across alternative decision choices. Regional development requires a system oriented treatment.

To create the dynamic model of a rural community for simulating its development over time five levels are set – Population, Local Budget, Welfare, Capital and Land. Each of these levels represents the principal vari-

able in a major subsystem of community structure (see figure 1).

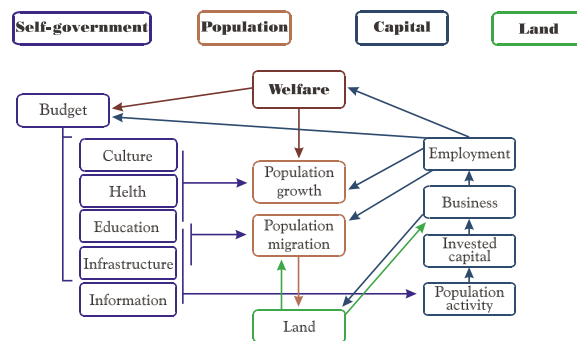


Figure 1. Structural blocks of community and their interactions

For developing the simulation model it is important to interconnect all these different sectors of a region and reflect their cross linkage, interfacing in reality and their feedback behaviour. To make a basis of the whole model several assumptions are made: a community is a closed system, hence it is possible to select the main factors that influence the behaviour of the system; a community is a small part of the state so there is no independent problem of food self-sufficiency and pollution, therefore we omit them; the main resource is agricultural land.

The model has the following target variables:

- Income per capita
- Employment
- Industrial, agricultural and services output

Control variables:

- Social infrastructure
- Economical infrastructure
- Capital investments
- Local budget income and expenditures divisions

Input variables:

- Land use structure
- Land quality
- Population
- Initial employment
- Initial capital investments

As an example the conceptual model of the feedback system of capital and employment is shown in figure 2.

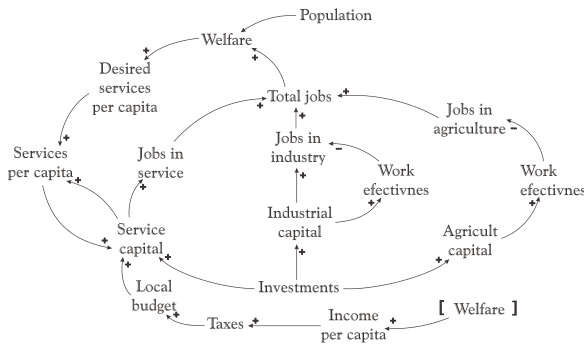


Figure 2. Causal loops of capital and employment

The Jobs can be created in three different economy sectors – Agriculture, Industry and Services. The amount of capital investments gives different outcome in terms of employment in different sectors. More capital, invested in Agriculture, gives higher work effectiveness and decreases employment in agriculture, more capital investments in Industry rise work effectiveness and on the other hand increase production capacity and require more workforce. Capital investments in the Services sector basically increase employment. Of course all these relationships are nonlinear.

The model is created using a special software – Powersim Constructor. The modelling process is based on flow diagrams, that were invented by Jay Forrester. Forrester diagrams are designed to represent any dynamic system in which a measurable quantity flows between system components. The flow diagram in figure 3 is part of the model which controls the Agriculture, Service and Industrial sectors' capital influence on Employment.



Figure 3. Flow diagram of capitals and employment

Symbols used in the diagram:

□ Level – state variable; physical quantities that can be measured directly over time; dynamic quantities.

○ Flow with rate – rate equations describe rates of inputs to, or outputs from, a state variable.

○ Auxiliary variable which controls flows by mathematical expressions; primarily used to simplify the writing of rate equations.

→ Information link – describes which variables influence each other.

○ Source or sink – origin of destination of a flow; outside the system and therefore not described in the model.

Every level in a flow diagram is a state variable that requires a differential equation. The left-hand side of the differential equation represents the rates of change as they are altered by the objects of the system. The right-hand side describes how these changes occur. Every material flow into and out of a state variable requires an explicit algebraic expression. The sum of these expressions associated with the inflow and outflow arrows is the right-hand side of the differential equation. Grouping all the inflows together and all the outflows together, a general differential equation for a single state variable is

$$\frac{dx}{dt} = \sum \text{inflows} - \sum \text{outflows}$$

The expressions for the inflow and the outflow can be quite complex. Therefore our problem in terms of quantitative model formulation is to find the appropriate set of expressions for the inflows and the outflows.

For the basic model average characteristics of parameters are chosen. The problem in creating the model is the lack of statistical data from the recent past on the subject of political changes in our country so some of the parameters have to be estimated. From this basic model we do not expect to get exact predictions of the outcome of different policies nor exact numbers about population, capital, etc. in a concrete year. It was made for increasing the knowledge about system behaviour under different circumstances; to increase understanding about inside development potential and choosing best outside projects for increasing strengths of the community.

References

Ruza, I., Rural communities decision making based on dynamic models. In: Proc. Rural integrated and sustainable development strategy: problems, models and key actions, seminar, Lithuania, 1999, Kaunas.

Ruza, I., System Approach in rural community developing projection. In: 196th Transactions of the Estonian agricultural university. Tartu 1998, 179-181.

EUROSIM

the Federation of European Simulation Societies

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

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

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

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

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

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

Letter of the President

On behalf of Elsevier I inform you that the price for the SIMPRA journal in 2000 increased with four Dutch guilders for eight issues.

I am pleased to inform you that starting with the year 2000, our journal "Simulation Practice and Theory" will be covered in the prestigious abstracting and indexing service "Web of Science". "Web of Science" is produced by the famous database publisher "Institute of Scientific Information" in Philadelphia. ISI is renowned for its publication of the Science Citation Index and the so-called journal impact factors. Impact factors are considered to be THE most important and most trustworthy indicator for the quality of a scientific periodical. Basically, the impact factor measures the quotient of the number of cited articles and the number of published articles and is hence a measure of the importance of the journal as a whole.

Yet, being incorporated in the Science Citation Index is already an explicit quality stamp. Contrary to common abstracting and indexing services, ISI applies strict criteria before they allow new journals into their databases: timeliness of publication, international editorial conventions and application of the peer review process are only a few of them. Even powerful publishing companies have no influence on ISI policies. Incorporation in Web of Science is a recognition of the excellent work SIMPRA's Editorial Board has done in bringing our young journal to this degree of maturity.

Last year in November I have received the first Bulletin of the Yugoslav Simulation Society. Congratulations with this first bulletin. The YSS was formally registered by the Serbian authorities in December, 1998. I hope that in due course they will fulfil the rules to become an observer member of EUROSIM. In September this year, they are organising a Small Systems Simulation Symposium in Nis, Yugoslavia. I hope that some people from EUROSIM will have the possibility to attend this symposium.

Furthermore I can inform you that the organisation of the EUROSIM 2001 congress is progressing well. The dates of the congress have changed a little bit. It will be a four day event from June 26 up to and including June 29, 2001. Please note the deadline for abstracts, which is August 1 this year. For more information: see the DBSS corner and the information on page 7 of this issue.

L. Dekker

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

<http://ta.twi.tudelft.nl/PA/Eurosime2001/index.html>

The dates of the congress have been changed.

The congress will be a four day event,
June 26 - 29, 2001 in Delft, The Netherlands

Please visit our website where you can find all latest news, o.a. the names of the invited speakers and the titles of their presentations, guidelines for short presentations etc.

During the summer hotel information and information with respect to the partner programme will become available.

Please note the deadline for submission of abstracts: August 1, 2000. Abstracts have to be mailed in printed form (1 copy) to Mrs. T. Tijanova (address below) and as an email to the email address: EUROSIM2001-abstracts@pa.twi.tudelft.nl.

Those interested to take part in the scientific or commercial exhibition, please contact the congress organisation by email.

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

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Scientific Committee: Alexik, M., Slovak Republic, Amamiya, M., Japan, Asenov, A., Scotland, Beek, W., NL, Boogaard, H. van den, NL, Braccio, B.R., USA, Breitenacker, F., Austria, Brejcha, M., Czech Republic, Brok, S.W., NL, Brugh, C., Ireland, Cap, C.H., Germany, Cate, H.H. ten, NL, Ceska, M., Czech Republic, Cheng, R.C.H., UK, Ciciani, B., Italy, Dekker, K., NL, Dekker, R., NL, DeTombe, D.J., NL, Dijkum, C. van, NL, Elzas, M.S., NL, Engelen, G., NL, Frietman, E.E.E., NL, Frijns, J.H.M., NL, Gelenbe, E., USA, Gerritsen, B.H.M., NL, Giani, S., Switzerland, Halin, J., Switzerland, Herik, H.J. van den, NL, Haman, Y., France, Huiskens, G., NL, Iazeolla, G. Italy, Javr, A., Hungary, Kagawa, Y., Japan, Karatza, H., Greece, Karplus, W., USA, Keane, J., UK, Kettenis, D., NL, Khoroshevsky, V., Russia, Kleijnen, J.P.C., NL, Korn, G.A., USA, Kropf, G., Canada, Langdon, W.B., NL, LeFvre, J., France, Li BoHu, China, Liebl, F., Germany, Lin, H.X., NL, Melas, V., Russia, Merkurjev, Y., Latvia, ren, T.I. Turkey, Paris, J.L., France, Pasveer, F.J., NL, Phua, P.K.H., Singapore, Pierreval, H., France, Pooley, R., Scotland, Quaglia, F., Italy, Roose, D., Belgium Savastano, M., Italy, Schikuta, E., Austria, Shapiro, E., USA, Sips, H.J., NL, Slood, P., NL, Sluis, L. van der, NL, Snorek, M. Czech Republic, Stanculescu, F., Romania, Sularia, M., Romania, Tezduyar, T.E., U.S.A., Theodoropoulos, G.K., UK, Thoma, J., Switzerland, Veer, P. van der, NL, Wang, X., China, Wang, Z., China, Westerkamp, C., Germany, Wolfe, J., USA, Zupancic, B., Slovenia.

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.

The ASIM Board met on November 26th, 1999 in Hamburg. Main topics were the election of the speaker and the vice speakers. Felix Breitenacker was elected as speaker. Sigrid Wenzel and Dietmar Möller were elected as vice speakers. Sigrid Wenzel's main responsibility will be the contact to industry and to the working groups, Dietmar Möller will focus on international contacts with EUROSIM, SCS and IMACS. The board thanked Dietmar Möller, the past speaker for his activities and for his agreement to take over again new responsibilities in the ASIM board.

Amongst the other topics discussed were the next conferences in Hamburg and Paderborn, activities of the working groups and the reorganization of the working groups. For a detailed report in German language see *ASIM-Nachrichten*, which are sent to ASIM members with this issue. If you did not receive the *ASIM-Nachrichten*, please contact Ingrid Bausch-Gall for a copy.

The next meeting of the Board will be on March 31th in Paderborn. Host will be Prof. Dörrscheidt, the organizer of the ASIM conference in 2001.

ASIM/SCS Book Series

Latest news on

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

Fortschritte in der Simulationstechnik – Frontiers in Simulation

In December 1999 the new book on "*Modellierung, Simulation und Künstliche Intelligenz*" has been published (editors: Helena Szczerbicka, Thomas Uthmann). This state of the art synopsis covers a broad range of concepts and research activities in the field of AI and Simulation. It focuses on the following aspects: modelling concepts, virtual environment, meta-models, qualitative modelling, optimisation, new paradigms in simulation, intelligent data analysis. ISBN

1-56555-128-1, 471 p., 58 Euro (ASIM/SCS members), 116 Euro (others) + mailing.

In March/April 2000 the new book "*Referenzmodelle für die Simulation in Produktion und Logistik*" will be available (editor: Sigrid Wenzel). In this multi expert compendium a survey is given on common "reference models" in various fields of application, processes and structures. The authors are members of a reference model working group within ASIM. ISBN 1-56555-182-6, 281 p., 45 Euro (ASIM/SCS members), 90 Euro (others) + mailing.

Also available: Proceedings of "*Simulationstechnik – 13. Symposium in Weimar*", Sept.1999 (editor: Georg Hohmann). ISBN 1-56555-130-3, 476 p., 60 Euro (ASIM/SCS members), 120 Euro (others) + mailing.

In preparation are two books. First, ASIM's working group "*Simulation Technischer Systeme*" does final editing on a volume on state-of-the-art and developments in this application area; the book "*Simulation technischer Systeme – Stand und Entwicklungen*" will be available in summer. Second, the new working group "*Grundlagen und Methoden*" works on a volume on new developments in simulation methodology, in modelling and simulation technique, and algorithms. Highlights will be set on bond graph modelling, virtual reality, co-simulation, inverse simulation, formal models and qualitative models.

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

Fortschrittsberichte Simulation – Advances in Simulation

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

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

The following new books are available in this series:

M. Lingl: Hybrid Modelling Approach in Discrete, Continuous and Combined Simulation, 2000; ISBN 3-901608-56-7, in preparation.

S. Pawletta: *Erweiterung eines wissenschaftlich-technischen Berechnungs- und Visualisierungssystems zu einer Entwicklungsumgebung für parallele Applikationen*, 2000, ISBN 3-901608-57-5

Ch. Almeder: *Hydrodynamic Modelling and Simulation of the Human Arterial Bloodflow*; 2000, ISBN 3-901608-58-3

Th. Preiß: *Relationale Datenbanksysteme als Basis für Modellbildung und Simulation von kontinuierlichen Prozessen*, 2000, ISBN 3-901608-59-1

All these books may be ordered from ASIM (see above). For books in the series "Advances" see <http://hobbes.rug.ac.be/~scs/>.

ASIM 2000

14. Symposium Simulationstechnik September 25 - 28, 2000, Hamburg

ASIM 2000, the 14. *Symposium Simulationstechnik*, will take place at Hamburg University from September 25 to 28, 2000, together with ESS 2000 (September 28 to 30, 2000).

Organizer: Prof. Dr.-Ing. D.P.F. Möller, Dipl.-Inf. B. Kesper, Dipl.-Inf. S. Bergstedt (*Universität Hamburg*)

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<http://www.informatik.uni-hamburg.de/TIS/ASIM2000.html>

ASIM 2001

ASIM 2001 will take place from September 11-14 at the University of Paderborn. Chair of the organizing committee is Prof. Dr.-Ing. Frank Dörrscheidt (department of control engineering). All aspects of modelling and simulation will be addressed:

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

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

Email:

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

ASIM Meetings to come

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

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

September 25-28, 2000: ASIM'2000 will be held at Universität Hamburg.

Conferences with ASIM participation

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

September 28-30, 2000: ESS at *Universität Hamburg*.

Meetings from cooperating societies

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

Working Groups (*Fachgruppen* FG)

“Verteilte Systeme und parallele Prozesse” (FG 1) New ASIM working group “Grundlagen und Methoden in Modellbildung und Simulation”

After a series of discussions and after questioning the working group members the ASIM working groups “Verteilte Systeme und parallele Prozesse” and “Simulationssoftware und -hardware” decided to join and doing further work as working group “Grundlagen und Methoden in Modellbildung und Simulation”. The main reasons were:

- In both working groups new developments broadened the spectrum
- This development resulted in intersections of both groups
- It was necessary to deal with methods and algorithms, etc.

The final decision for founding the new working group was made at the last meeting in Vienna. The working groups will prepare necessary files for applying for this group at the *GI – Gesellschaft für Informatik*, where ASIM is part of.

Actual information may be found in the WWW: <http://www.asim-gi.org/fg1/>

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

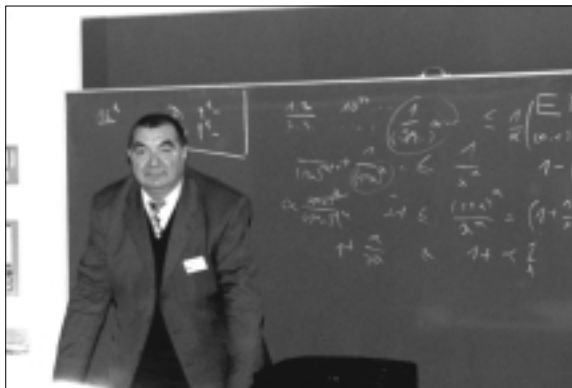
“Simulationssoftware und -hardware” (FG 2) New ASIM working group “Grundlagen und Methoden in Modellbildung und Simulation”

Meeting February 1, 2000

On February 1, 2000 the ASIM working group “Simulationssoftware und -hardware” organised a one-day meeting at the beginning of the 3rd Mathmod conference at Vienna University of Technology. The meeting dealt with modern development in simulation techniques, from virtual reality to high-level modelling with bond graphs. As participants of the MATHMOD conference also attended the meeting, all contributions were given in English.

F. Breiteneker, the organiser of the meeting, could welcome about 110 participants (about 40 from ASIM, 30 from the international “simulation community”, and about 40 from Vienna University of Technology, see next figure). The program discussed a broad variety of developments:

- Bond Graph Modelling – Analog Intuition in a Digital World (D. Karnopp, Univ. of California)
- Trends in Modeling and Simulation Induced by a Bond Graph Representation (P. Breedveld, Univ. Twente)



- *Bondgraphen und Objektorientierte Modellierung – eine vergleichende Betrachtung* (Wolfgang Borutzky, Univ. Köln)
- Developments in Soft Computing wrt. Modelling and Simulation (D. P. F. Möller, Univ. Hamburg)
- *Hardware-Software-Cosimulation digitaler Systeme* (Peter Schwarz, Jürgen Haufe, Fraunhofer-Institut für Integrierte Schaltungen, EAS Dresden)
- Inverse Simulation: a New Challenge (D. J. Murray-Smith, Univ. Glasgow, Scotland)
- Morphological Models for Reconstruction of Patterns and Structure (E. Godehardt, Univ. Düsseldorf)
- Virtual Reality and Simulation in Robotics (Ervin Toth, Hungary)
- From Fuzzy to Real Fuzzy – Different Implementation Models of Fuzzy Modules – Evaluation ARGESIM Comparisons (F. Breiteneker, Vienna Univ. of Technology)

Especially the contributions on bond graph modelling resulted in a very interesting discussion, because well-known specialists on bond graph modelling attended the meeting: the contributions of D. Karnopp, B. Breedveld and W. Borutzky were commented by J. Granda and J. Thoma. It was a rare event, when all these specialists met (see picture below, where only J. Thoma is missing).



At the end of the meeting Mr. Schwarz (following fig., discussing the development of the working groups), head of the ASIM working group “Verteilte

Systeme und parallele Prozesse” and Mr. Breiteneker, head of the ASIM working group “Simulationsoftware und -hardware”) underlined their willingness to combine both groups to an ASIM working group “Grundlagen und Methoden”.



As first common action the working groups decided to publish the contributions of this meeting, together with some other selected contributions, as volume in the ASIM/SCS series “Frontiers in Simulation”. All participants agreed to send contributions.

Working group joins with working group FG1

As shortly mentioned in the section on ASIM working group “Verteilte Systeme und parallele Prozesse”, both working groups will join and set up a new ASIM working group FG1/2 “Grundlagen und Methoden in Modellbildung und Simulation”.

Until the first elections, Mr. Schwarz will be head of this working group.

Vice heads will give support. Up to now the following people will assist as vice heads, specialising on certain subjects): Th. Schulze, Univ. Magdeburg (HLA, Distributed Simulation); H. Prähofer, Univ. Linz (formal models, discrete simulation, DEVS); M. Günter, Univ. Karlsruhe (numerics, modelling with PDEs); F. Breiteneker (continuous simulation, comparisons of simulators and simulation techniques)

Speaker: Prof. Dr. Felix Breiteneker, TU Wien, Abt. Simulationstechnik, Wiedner Hauptstraße 8-10, A-1040 Wien, Tel: +43-1 58801 11452, Fax: +43-1 58801 42098, email: Felix.Breiteneker@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 14th Workshop of the working group, focussed on the “Multi-Agent Systems and Individual-based Simulation” is held in Würzburg, Germany, March 20-21, 2000.

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

Speaker: Prof. Dr.-Ing. Helena Szczerbicka, Universität Bremen, Rechnerarchitektur und Modellierung, Fachbereich 3 - Informatik, Postfach 33 04 40, D-28334 Bremen, Tel.: +49-421 218 7389 or 7390, Fax +49-421 2187385, email: helena@informatik.uni-bremen.de

Vice-speaker: Dr. Thomas Uthmann, Johannes-Gutenberg-Universität Mainz, Institut für Informatik, Staudingerweg 9, D-55099 Mainz, Tel.: +49-6131 39-3610, Fax +49-6131 39-3534, email: uthmann@informatik.uni-mainz.de

“Simulation in Medizin, Biologie und Ökologie” (FG 4)

Speaker: Prof. Dr. Dietmar Möller, Universität Hamburg, FB Informatik, Vogt-Kölln-Str. 30, D-22527 Hamburg, Tel.: +49-40 5494 2438, Fax: +49-40 5494 2206, email: Dietmar.Moeller@informatik.uni-Hamburg.de

Vice-speaker: Prof. Dr. Otto Richter, TU Braunschweig, Institut für Geographie und Geoökologie, Langer Kamp 19c, D-38106 Braunschweig, Tel.: +49-531 391 5627, Fax: +49-531 391 8170

“Simulation technischer Systeme” (FG 5)

Speaker: Ewald Hessel, Hella KG Hueck&Co., Abt. EL-R, Werk II, Beckumer Straße, D-59552 Lippstadt, Tel.: +49-2941 38 8572, Fax: +49-2941 38 8427, email: hessel@hella.de

Vice-Speaker: Dr. Achim Wohnhaas, debis Systemhaus, Project Division, Fasanenweg 9, 70771 Leinfelden-Echterdingen, Tel.: +49-711 972 5333, Fax: +49-711 972 1913, email: awohnhaa@debis.com

“Simulation in Produktion und Logistik” (FG 6)

The next event arranged by the ASIM-Working Group is the 9th Working Group Conference on March 8 - 9th, 2000 in Berlin, Germany. The conference is a platform for users, vendors and researchers in the field of simulation. Applications for example are supply chain management, manufacturing applications, intelligent logistic control systems, logistics, planning & control and simulation application within the enterprise. Additionally, at a few sessions simulation tools & algorithms, simulation & visualisation and HLA applications for distributed simulation are discussed. For the first time the conference languages are German and English.

For further information about the event please contact Markus Rabe, Fraunhofer Institute for Production Systems and Design Technology (email: Markus.Rabe@ipk.fhg.de), further information about the Working Group you can find under <http://www.asim-pl.uni-kassel.de/>

Speaker: Dr. Sigrid Wenzel, Fraunhofer Institute for Materialflow and Logistics, Joseph-von-Fraunhofer-Str. 2-4, D-44227 Dortmund, Tel. +49-231 9743 237, Fax: -234, email: wenzel@iml.fhg.de

Vice-speaker: Hans Joachim Gora, Adam Opel AG, ITDC-Manufacturing Engineering, Strategies & Planning, D-65423 Rüsselsheim, Tel.: +49-6142 7 72164, Fax -61763, email: hans.joachim.gora@de.opel.com

“Simulation in der Betriebswirtschaft” (FG 7)

Speaker: Prof. Dr. W. Hummeltenberg, University of Hamburg, Institute for Computer Science in Business Administration, Max-Brauer-Allee 60, D-22765 Hamburg. Tel.: +49-40 4123 40 23, Fax: +49-40 4123 64 41, email: wi@mba.uni-hamburg.de

Vice-speaker: Prof. Dr. Biethahn, Georg-August-University of 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 Umwelthanwendungen” (FG 9)

<http://www.informatik.uni-rostock.de/FB/Praktik/Mosi/FG/> (or <http://www.asim-gi.org/fg9/>)

Speaker: Dr.-Ing. Jochen Wittmann, University of Rostock, Computer Science Department, Research Group Modelling and Simulation of Computer Systems, Albert-Einstein-Str. 21, D-18059 Rostock, Tel.: +49-381 498 3368, Fax: +49-381 498 3426, email: wittmann@informatik.uni-rostock.de

Vice-speakers: Dr. Rüdiger Hohmann, Otto-von-Guericke University of Magdeburg, Department of Simulation and Graphics, PF 4120, D-39016 Magdeburg, Tel.: +49-391 671 2017, Fax : +49-391 671 1164, email: hohmann@isg.uni-magdeburg.de

Prof. Dr. Bernd Page, University of Hamburg, Computer Science Department, Research Group Angewandte und Sozialorientierte Informatik (ASI), Vogt-Kölln-Str.30, D-22527 Hamburg, Tel.: +49-40 42883 2426, Fax: +49-40 42883 2311, email: page@informatik.uni-hamburg.de

Ingrid Bausch-Gall

CROSSIM

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

On February 19, 2000 the General Assembly elected the new president and vice president. For the mandate of four years the president will be Vesna Bosilj Vuksic and the vice-president will be Jadranka Bozиков.

Membership

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

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Activities

- Co-organizing the 22nd International Conference "Information Technology Interfaces" ITI 2000, Pula, Croatia, from June 13-16, 2000. The conference has traditionally a strong modelling and simulation session.
- Co-organizing the 3rd European Ecological Modelling Conference to be held in Croatia during September 2001. Proceedings of the 2nd conference will be published as a special issue of *Ecological Modelling Journal*, Elsevier.

- Regularly organizing a simulation seminar and workshops held at the Faculty of Economics, University of Zagreb. Members are encouraged to exchange experiences, discuss current problems and initiate cooperative activities.
- The following seminars were held recently:
 - A model of life support system for interplanetary missions* (T. Klanjscek)
 - Biomechanics of human walk* (V. Zanchi)
 - Construction of a data base for simulation of human walk* (V. Paic)
 - Computer models of general equilibrium* (J. Sohinger)
 - Ecological modelling Internet resources* (T. Legovic)
- 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.
- Cooperating in publishing *CIT*, a *Journal of Computing and Information Technology*. The aim of the international Journal of Computing and Information Technology (CIT) is to present original scientific and professional papers, as well as review articles and surveys, covering the theory, practice and methodology of computer science and engineering, modelling and simulation, and information systems.
- Preparing publication of a booklet about the CROSSIM society
- The first WWW site in Croatian devoted to simulation was developed at the Faculty of Electrical Engineering and Computing. Its address is: <http://www.rasip.fer.hr/nastava/mis/>
- Initial WWW site of the society is: <http://rudjer.irb.hr/~crossim/>
- The CROSSIM e-mail distribution list at the Computing Centre of the University of Zagreb serves as a communication medium among members. To subscribe please send to LISTPROC@CARNET.HR a line of text (leave an empty subject line) SUBSCRIBE CROSSIM your name and surname. To send e-mail to all members at once just send an e-mail to: CROSSIM@CARNET.HR

V. Bosilj Vuksic

CSSS

General Information

CSSS (The Czech and Slovak Simulation Society) has about 90 members in 2 groups connected to the Czech and Slovak national scientific and technical societies. The main objectives of the society are: development of education and training in the field of modelling and simulation, organising professional workshops and conferences, disseminating information to its members about modelling and simulation activities in Europe, informing the members about publishing in the field of modelling and simulation. Since 1992 CSSS is a full member of EUROSIM

Coming Events

The 7th International Symposium “**Railways on the edge of third millennium**” (ZEL '2000) will take place on May 30-31, 2000 in Zilina, Slovak republic. One of the interesting topics is “Simulation of Railways Stations”. The chairman of the international program committee is Prof. Ing. L. Skyva, FRI-KTK, University of Zilina.

The 34th International Conference on “**Modelling and Simulation of Systems**” (MOSIS '2000) will take place on May 2-4, 2000, Roznov pod Radhoštěm, Czech republic. The Conference will be connected with two Workshops: workshop ISM'2000 – Modelling of Information System, and workshop MANAM'2000 – Modelling in Manager Works. The chairman of the international program committee is Dr. Ing. Jan Stefan. For more information please mail to jan.stefan@vsb.cz.

The International Workshop “**Methodology of Modeling and Simulation**” will take place on August 30-31, 2000 in Zilina, Slovak republic. The chairman of the workshop is Prof. M. Alexik. The workshop will be connected with meeting of CSSS Steering Committee.

The 22nd International Workshop “**Advanced Simulation of Systems**” (ASIS '2000) will take place in the Moravian town Sv Hostýn, Czech republic on September 12-14, 2000. The chairman of the international organising committee is Dr. Ing. Jan Stefan. The workshop will be connected with annual meeting of CSSS.

The scientific conference with international participation “**Electronic Computers and Informatics '2000**” with a section on “Modelling and Simulation of the systems”, will be held on September 28-30, 2000 in Herlany, Slovak republic. General chair of the con-

ference is Prof Ing. Milan Jelsina Technical university Kosice, Slovak republic. Organization chair is Dr. Ing. J. Baca, (bacaj@tuke.sk). Herlany is a small spa 30 km from Kosice.

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M. Alexík

DBSS

General Information

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

DBSS Membership

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

The contribution is divided in two options:

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

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

tomatically 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
M.J. Dekker-Genemans	Secretary
W. Smit (AKZO NOBEL)	Treasurer
Th.L. van Stijn (Ministry of Public Works/RIKZ)	Member

Past Events

Notes on the NOSMO and TBM meeting, TU-Delft, The Netherlands, November 15, 1999

The undersigned followed in the NOSMO and TBM meeting two lectures on the theme of soft-modeling. One lecture was given by Dr. Cathal M. Brugha from Dublin, and the other by Dr. Giampiero E.G. Beroggi from Delft. Brugha's presentation focussed on the meta world(s) behind model-building, especially in the dealing with complex societal issues. In principle Brugha's line of thinking follows a common process, which can be best described by: pull-perception-proposition-push, to make events accessible for further analysis. Via a logical procedural process, Brugha shows that with his meta-thinking he can serve basically eight groups of people for different model views, viz. the puzzle solver, the empiricist, the dialectician, the change agent, the iconoclast, the classifier, the decision theoretician and the chronicler. Because the objective validation and verification procedures known in math-

ematical-physical models are not applicable in societal modeling, Brugha lays big emphasis on the following three aspects of making a socially acceptable model: adjusting, convincing, and committing. Brugha's work is of great value not only in the world of societal models, but also in models with hard and soft parts. Beroggi's presentation titled "Participative Land Use Management" was a clear example of coaching negotiation processes with modeling techniques. Such processes are often dynamic, participative, integrative, facilitating, and less directing. Important in an acceptable and successful negotiation process are among others the joint-problem perception, the insights in interests, power and positions, the identification of the relevant actors and actions. Moreover, it is important to identify the conflict resolution potential of the participants, to arrive at general accepted indicators, and to shape the negotiation process in such a model that planners can work with it. Interesting in both lectures was the common idea that some basics in societal modeling are slowly emerging. Especially Brugha published some interesting papers, which can be read on his website. Also for the typical hard modelers these findings may be worthwhile in order to create models, which are more acceptable for the public at large. The meeting was organized by Dorien DeTombe of Delft University, was well prepared and marked by vivid discussions. In the welcome address we could inform the audience on the Eurosim 2001 Congress and some persons showed interest to participate, because societal modeling is an important item in the Congress, which is dedicated to shaping future.

Iva & Wim Smit (DBSS)

Seminar on 3D Visualisation: (The Hague, November 1999)

In November 1999 representatives from the Eurosim organising committee visited the Visualisation Seminar organised by the RIKZ (National Institute for Coastal and Marine Management) in The Hague. The seminar was a joint initiative of the Computer Graphics Department of Delft Technical University and the RIKZ and was organised by G.W.Bultman.

The seminar hosted several speakers on diverse topics such as Java 3D, Visual Data mining, GIS applications, and the application of visualisation techniques in examining the results of simulations (such as silt dispersions on the North Sea). The seminar was attended by approx. 100 people, most of them from Delft Technical University and Rijkswaterstaat (Ministry of Transport, Public Works and Water Management). One of the speakers, Kees Lemmens of Delft University (also member of the Eurosim 2001 organising

committee), discussed the role of Java 3D in visualisation. He outlined the basic programming concept and showed some demonstrations of typical 3D applications such as Rotational and Animating Behaviour, the use of Alpha objects and Interpolators and the technique to create user defined shapes.

G.W. Bultman and K. Lemmens

Coming Events

It is the intention to organise still a **one day symposium** this year. After this symposium the General Meeting of the DBSS will take place. The members of the DBSS will be informed by regular mail as soon as more information is available.

EUROSIM 2001

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

The dates of the congress have been changed.
The congress will be a four day event,
June 26 - 29, 2001 in Delft, The Netherlands.

Please visit our website where you can find all latest news, o.a. the names of the invited speakers and the titles of their presentations, guidelines for short presentations etc.

Please note the deadline for submission of abstracts: August 1, 2000. Abstracts have to be mailed in printed form (1 copy) to Mrs. T. Tijanova (address below) and as an email to the email address:
EUROSIM2001-abstracts@pa.twi.tudelft.nl.

<http://ta.twi.tudelft.nl/PA/Eurosime2001/index.html>

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

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

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

Modelling & simulation of continuous systems

This pole has been working for several years and has already organised 3 workshops (2AO92, 2AO94, 2AO96) which grouped industrials and academics in the field of modelling and simulation of continuous systems. It has also produced a document for the evaluation of modelling and simulation software which was published in the EUROSIM 1995 Congress in Vienna. The pole is presently reorienting its work towards the organisation of one day workshops on specific subjects. It had organised in April 1999 BioMedSim'99, a conference on modelling and simulation in medicine and biology. This conference has led to the selection of several papers to appear in a special issue of SIMPRA. This pole will organise in 2001 the 2nd BioMedSim'01 in parallel with the EUROSIM congress.

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

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Y. Hamam

HSS

General Information

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

Activities

At the Simulation Laboratory of the Department of Information Management on the Faculty of Economic and Social Sciences of the Technical University of Budapest a series of lectures on various aspects of simulation is held on a regular basis for students, academics and external experts of various fields. In these lectures different simulation tools and fields of applications are dealt with.

We are co-operating in the organization of several international simulation conferences as 22nd International Conference on Information Technology Inter-

faces, Pula, Croatia; European Concurrent Engineering Conference '2000, EUROSIM 2001 - the 4th International EUROSIM Congress, where HSS is one of the co-sponsors.

Efforts are being made to increase the simulation activities in institutions located beyond the capital and include teaching staff and students as well as industry.

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A. Jávör

ISCS

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

Contact Address

For further information or application for membership, please contact:

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PSCS

General Information

PSCS (The Polish Society for Computer Simulation) was founded in 1993 in Warsaw. PSCS is a scientific, non-profit association of members from universities, research institutes and industry in Poland with common interests in variety of methods of computer simulations and its applications. At present PSCS counts 209 members. The Board of third cadence consisting of the following persons directs the affairs of the PSCS:

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

Activities

The main activity of the Polish Society for Computer Simulation is annual conferences known as "PSCS Workshops on Simulation in Research and Development". The third PSCS Workshop was organized in 1996 in Wigry. The fourth and fifth PSCS Workshops were organized in 1997 and 1998 in Jelenia Gora.

Past Events

On January 21, 2000 the general assembly of PSCS members was held in Warsaw. This meeting, besides representing an interest forum to discuss and promote the activity of the society, was the occasion to elect the Board for the period 2000-2002.

The 6th PSCS Workshop on "Simulation in Research and Development" was held on August 25-27, 1999 in Bialystok and Bialowieza, Poland. The about 110 Polish participants attended the workshop with a few guests from Germany, Mexico, and New Zealand. Three parallel sessions with 72 regular papers and two plenary lectures of Prof. E. Raczynski and Prof. K. Pawlikowski covered the following areas: simulation methodology, simulation in mechanical engineering, simulation in mathematical problems, artificial intelligence and simulation, simulation in transportation, neural nets and simulation, simulation in automation and control, military simulation, simulation tools. The workshop brought together a broad range of individu-

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

Publications

Proceedings of the 5th PSCS Workshop on "Simulation in Research and Development", R. Bogacz and A. Tylikowski (Eds.), Warsaw, 1999, ISBN 83-902146-2-8, (in Polish). The price is 20,- PLN.

Coming Events

Prof. E. Kolodzinski and Prof. Z. Strzyzakowski will organize the 7th PSCS Workshop on "Simulation in Research and Development" on September 14-16, 2000 in Zakopane-Koscielisko, Poland. E-mail: gogolek@ias.wat.waw.pl

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ROMSIM

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

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SIMS

SIMS is the Scandinavian Simulation Society with members from the four Nordic countries Denmark, Finland, Norway and Sweden.

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 become the full member of EUROSIM in 1996. It has 87 members

from both Slovenian universities, institutes and industry as well and aims to the promotion of modelling and simulation in industrial and academic environments and to facilitate communication among corresponding groups.

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slosim@fe.uni-lj.si

News

On November 25 the SLOSIM board had a regular meeting at the Faculty of Pharmacy. Some future activities were discussed:

- The new SLOSIM web page is in preparation.
- May 19, 2000 10 am, Faculty of El. Eng. Ljubljana: the lecture of Prof. Job van Amerongen, Drebber Research Institute for Systems Engineering, and Control Laboratory, Faculty of Electrical Engineering, University of Twente, Netherlands.
Title: "Modelling, Simulation and Controller Design of Mechatronic Systems with 20-sim 3.0"
Abstract: 20-sim is a very valuable object oriented tool for (mechatronic) research and education. In the presentation the features of 20-sim will be shown by means of the interactive design of a (digitally controlled) servo system with different degrees of complexity.
- SLOSIM will organize at least two modelling and simulation sessions on the ERK 2000 conference in Portoroz, September 2000.
- November 2000: The presentation of an Electronic group from the Faculty of El. Eng. and Informatics, University of Maribor.
- Nov. 2000: The regular annual assembly.

After the SLOSIM board meeting there was the presentation of an Interdisciplinary research group for modelling and simulation in pharmacokinetics at the University of Ljubljana.

B. Zupancic

United Kingdom Simulation Society

General Information

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

Discrete Event Simulation and System Dynamics: Never the Twain Shall Meet?

Wednesday 12th April 2000, 9:30am-4:00pm
Executive MBA Teaching Centre Warwick Business School, University of Warwick, Coventry

When you want to build a simulation model how do you choose what kind of simulation approach to use? The choice between discrete event simulation and system dynamics may not be as straightforward as asking whether or not the real situation is discrete or continuous in nature. If you take a situation to be modelled, will a discrete event simulation expert automatically see the model as a discrete event simulation model and a system dynamics expert automatically see it as a system dynamics model? Or, alternatively, are there lessons to be learnt in how to choose which simulation method to use? The meeting will bring together presenters from both industry and academia to discuss their experiences using both discrete event simulation and system dynamics modelling. The day will finish with an informal discussion session where attendees will be encouraged to debate around issues that have arisen during the meeting.

Booking a Place

To cover catering costs there is a £ 10 charge for this meeting. Please reserve a place by sending a cheque (payable to the UK Simulation Society), giving your name and contact details, to:

Dr Stewart Robinson,
Warwick Business School,
University of Warwick,
Coventry, CV4 7AL

Directions to the meeting can be found at:
<http://www.wbs.warwick.ac.uk/maps/>

The Executive MBA Teaching Centre is on the central campus between Radcliffe and Scarman House. (Note: since it is a new building it is not marked on the map.) For further details please contact:
Stewart Robinson (tel: 01203-522132,
email: stewart.robinson@warwick.ac.uk)
Simon Taylor (tel: 01895 203389,
email: simon.taylor@brunel.ac.uk)

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

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

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

Future workshops are planned for next year.

Membership

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

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Dept of Computing and Information Systems
London Guildhall University
100 Minories
London EC3N 1JY
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Fax: +44 171 320 1717
email: gjones@lgu.ac.uk

Gary J. Gray

1. About SCS and SCS Europe

SCS is the international, multidisciplinary forum dedicated to research, development, and applications of simulation. Since its founding in 1952, the Society for Computer Simulation's membership roster has been made up of engineers, scientists, managers, business professionals, students, and educators. A very diverse field whose interests include: artificial intelligence, microcomputers in simulation, methodology and validation, supercomputers, and more. In 1985, SCS International started a European Office at the University of Ghent, Belgium. In 1994, the SCS European Office was changed into SCS Europe BVBA, which now is the organisational and financial body behind the SCS European Council (established in 1991).

SCS Europe BVBA also includes the SCS European Publishing House. SCS Europe BVBA organizes international scientific conferences on computer simulation and related fields. On a yearly basis, it takes care of the "European Simulation Multiconference" ESM, the "European Simulation Symposium" ESS, and two smaller conferences: the "European Concurrent Engineering Conference" (ECEC) and the "Scientific Conference on Web Technology, New Media, Communications and Telematics" EUROMEDIA. SCS Europe BVBA is also involved in the organization of local workshops. It should be stressed that all these activities are in close cooperation with the SCS European Council.

2. Report of a foregoing SCS event

ESS'99

ESS'99, the 11th European Simulation Symposium (and fourth ESS Conference devoted to Simulation in Industry) has been held in Erlangen (Germany), October 26-28, 1999.

The conference featured 134 presentations. An overview of the presentations can be found on our website: <http://hobbes.rug.ac.be/~scs/conf/ess99/>. The highlights of the event were the keynote speech by Nadia Magnenat-Thalmann entitled "The Simulation of Humans in Virtual Reality: Problems and Solutions", and the course on HLA given by Roy Crosbie and John Zenor of the University of California at Chico. The best paper was awarded to the paper entitled "Computer Simulation as a Tool for Calculation of The Paging System Capacity" by Miroslav Belosovic and Mladen Kos. The paper can now be viewed on [http://](http://hobbes.rug.ac.be/~scs/conf/ess99/)

hobbes.rug.ac.be/~scs/conf/ess99/ or be downloaded from this page. The Conference Proceedings are available from SCS Europe. Further information can be found on <http://hobbes.rug.ac.be/~scs/pub/pr-sim.html>.

3. Coming SCS events

- **ECEC'2000**, 7th European Concurrent Engineering Conference, De Montfort University, Leicester (UK), April 17-19, 2000.

The conference aim of ECEC'2000 is to provide a forum to European researchers, where they can discuss the latest developments linked to Concurrent Engineering focussed on European research projects. Topics are: 1. Organisation and management, 2. Formal methods and techniques, 3. Implementation techniques, 4. Process modeling, 5. Engineering data management and information modeling, 6. Engineering process management, 7. Collaborative CE environments and virtual design studios, 8. Networking and distribution in CE, 9. Practical applications and experiences.

See for more details: <http://hobbes.rug.ac.be/~scs/conf/ecec2000/>. Abstract submission is closed; 48 papers have been selected to be presented in the scientific programme.

- **Agent-Based Simulation**, workshop organised by SCS-Europe and ASIM on the occasion of prof. Bernd Schmidt's 60th birthday, Passau (Germany), May 2-3, 2000.

Topics are: Basic Methodology; Agent-Architectures; Model-Specification and Languages; Mobile Agents; Multi-Agent Systems: Interactions and Communication; Micro-Macro Simulation and Emergent Behaviour; Decision Making and Strategies; Applications (in Biology, Behavioural Sciences, Social Systems and Artificial Societies, Economics and Market Systems, Business Process Management, Manufacturing Management, Cooperative Task Management, Medicine and Health Care, Computer Science, Agents in the Internet). More information can be found on: <http://hobbes.rug.ac.be/~scs/> and on <http://www.or.uni-passau.de/workshop2000/>. Abstract submission is closed; 62 papers have been selected to be presented in the scientific programme.

- **EUROMEDIA 2000** (featuring WEBTEC, MEDIATEC, COMTEC and APTEC), Provincie Huis, Antwerp (Belgium), May 8-10, 2000.

The fields covered at this conference include Web

technology, multimedia, telecommunications, mobile computing, broadband networking, distributed computing, and telematics. The keynote for this event is by Nadia Magnenat-Thalmann of MIRALAB, Geneva, Switzerland. This year special emphasis is put on business starters. Further information can be found on <http://hobbes.rug.ac.be/~scs/conf/euromd2000/>. Abstract submission is closed; 67 papers have been selected to be presented in the scientific programme.

- **ESM'2000** (14th European Simulation Multiconference), May 23-26, 2000, Ghent, Belgium. Please notice that this conference has been moved forward to the end of the month of May; this was due to the fact that we were unable to obtain the conference rooms for the June period. Topics are: Simulation in Supply Chain Management & Logistics; Simulation in Education & Corporate Training; Simulation in Biology, Medicine & Health Care Systems; Simulation in Industry and Services; Simulation Methodology, Tools and Standards; Simulation and Operations Research; Simulation in Control Engineering and Artificial Intelligence; Simulation in Communication and Networks. Abstract submission is closed.
- **FOODSIM'2000**, International Conference on Simulation in Food and Bio-Industries, Nantes (France), June 26-27, 2000. Topics are: Food Engineering and Processing; Food Sciences and Biotechnology; Food Economics, Production and Logistics Management; Simulation Methodology related to the food Industry; Simulation and Education related to the food Industry. For more information, please go to: <http://hobbes.rug.ac.be/~scs/>. Abstract submission is closed; 71 abstracts have been received.
- **MESM'2000** (the 2nd Middle East Symposium on Simulation and Modeling) is set for August 28-30, 2000 and will be held at Philadelphia University, Amman, Jordan. The conference themes are: Modelling and Simulation Methodology; Simulation of Networks and Communication Systems Simulation; Simulation of Signal and Image Processing; Energy System Simulation; Multimedia and Virtual Reality Systems; Decision Processing in Management; Modelling and Simulation for Biomedical Applications; Modelling and Simulation for Industrial Applications; Web-based Simulation; Software Engineering; Simulation in Information Processing; Simulation in Fuzzy Systems, Neural Networks and Genetic Algorithms; Simulation in the Arab World. The deadline for abstract or concept paper submission

is April 20, 2000. For more information, see <http://hobbes.rug.ac.be/~scs/conf/mideast2000/index.html>.

- **ESS'2000**, the 12th European Simulation Symposium and Exhibition (and fifth ESS Conference devoted to Simulation in Industry) will be held jointly with the yearly ASIM-Conference, September 28-30, 2000 at the University of Hamburg, Hamburg (Germany). Tracks: Simulation Methodologies and Tools; Simulation in Aerospace; Simulation in Environmental Systems/Processes; Simulation in Industry and Services; Simulation in Automotive Industry; Simulation in Business and Finance and Datamining; Simulation in Virtual Reality; Simulation in Automotive and Traffic Systems. Abstract and concept paper submission deadline: April 25, 2000. See for further information: http://www.informatik.uni-hamburg.de/TIS/Tagungen/ESS2000/ESS2000_Flugi.html.
- **GAME-ON 2000**, a new event is scheduled for the November 2000 timeslot concentrating on the use of computer simulation, AI and graphics programming for computer games. More information will follow.

For more details about the above coming SCS or SCS-related events, please have a look to our Website:

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

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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 Europe and ASIM our books in the series "Advances in Simulation" and "Frontiers in Simulation" are published as common products of the European Publishing House and Argesim; the chief editors of both series are: Prof. Felix Breitenacker, Prof. Gerald Kampe, Prof. Eugene J.H. Kerckhoffs, Prof. Axel Lehmann, Prof. Dietmar

P.F. Moeller, Prof. Henri Pierreval, and Prof. Richard Zobel. For more information or to order books, please contact:

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

5. Final notes

- New Summer Course for 2000: During the ESS'99 (see section 2), a succinct course was given by Roy Crosbie and John Zenor on HLA. This was so successful that SCS Europe will propose this course for next summer somewhere in Europe. More information on this subject will follow.

- New Conference Locations sought: SCS Europe has for the moment conference sites for its simulation and other conferences till 2002. If you want your university to be the conference site for any future conference, in which you yourself would like to be involved in some way, just let us know. You can contact: Philippe.Geril@rug.ac.be.
- Advertise your company or products on our website. Just provide us with your banner or logo and we will link you to more than 8000 dedicated visitors per year, active in the fields of computer simulation, concurrent engineering and multimedia. And this for a nominal cost of 100 EURO/month!

*P. Geril, E.J.H. Kerckhoffs, R. Rimane
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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.

New Simulation Books

1999 was an outstanding year in the publication of excellent simulation texts. Some of the most exciting books were:

Parallel and Distributed Simulation Systems,
by Richard Fujimoto

Creating Computer Simulation Systems,
by Fredrick Kuhl, Richard Weatherly, & Judith Dahmann

Networked Virtual Environments, by Sandeep Singhal and Mike Zyda

Simulation Modeling and Analysis, Third Edition,
by Averill Law and W. David Kelton

Theory of Modeling and Design, Second Edition,
by Bernard Zeigler and Tag Gon Kim

These and other leading simulation references are accumulated on a single web page at:
<http://www.modelbenders.com/bookshop/>

Regular Activities

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

SIGSIM maintains a web page at <http://www.acm.org/sigsim/> where current news, links to conferences, electronic publications, and special activities are maintained. SIGSIM also sponsors a mailing

list for simulation professionals which is open to all interested parties. Instructions for subscribing to the mailing list are available on the web page.

Special Activities

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

Contact Addresses

Ernest Page, SIGSIM Chair
MITRE Corporation
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Membership

SIGSIM has approximately 600 members distributed among 50 countries around the world. Annual membership fees are \$22 when accompanied by membership in ACM. Members receive the CD-ROM version of the *Proceedings of the Winter Simulation Conference*, the paper version of the *Proceedings of the Parallel and Distributed Simulation Workshop*, registration discounts on SIGSIM sponsored conferences, and access to the Distinguished Lectureship Series on the SIGSIM Web page. Additional membership information is available from:

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<http://www.acm.org/sigsim/>

Roger Smith

INFORMS

Call for Nominations for the INFORMS College on Simulation DISTINGUISHED SERVICE AWARD

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

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

Nominations for the Distinguished Service Award can be made by anyone and are made by sending a letter of nomination to the chair of the award selection committee by October 1, 2000. Letters of nomination should identify the nominee's areas of exceptional service, detailing the activities for which the nominee is believed to deserve this award. The nominee's current vita must be included with the nomination letter. The individual or individuals making the nomination have the primary responsibility for justifying why the nominee should receive this award. If given, the award will be presented in December at the 2000 Winter Simulation Conference in Orlando, Florida (<http://www.wintersim.org>).

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

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

W. David Kelton
Department of Quantitative Analysis
and Operations Management
College of Business Administration

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LSS

The Latvian Simulation Society

The Latvian Simulation Society is organising, in co-operation with the Baltic Operations Research Society, the Second International Conference "Simulation, Gaming, Training and Business Process Reengineering in Operations" (September 8-9, 2000, Riga, Latvia). The conference will be hosted by the Riga Technical University, and deal with both theoretical and practical aspects of Operational Research and Simulation in the fields of manufacturing, logistics, transportation and services. The previous conference was held in Riga in September, 1996, and gathered together more than a hundred participants from 15 countries all over the world.

For more information please turn to the conference web site <http://www.itl.rtu.lv/RigaConf2000/>, or contact conference General Chair:

Prof. Yuri Merkurjev
Riga Technical University
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LV-1658 Riga, Latvia
Phone +371-7089514
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Email: merkur@itl.rtu.lv

Y.Merkuryev

YSS

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**JSST INTERNATIONAL CONFERENCE
ON MODELING, CONTROL AND COMPUTA-
TION IN SIMULATION****October 24-26, 2000****Centennial Memorial Hall,
Tokyo Institute of Technology, Tokyo, Japan**

The JSST is the registered society, recognized by the Science Council of Japan. The Society had its first international conference, JSST Conference on Recent Advances in Simulation of Complex System, Tokyo in 1986. This conference is to maintain collaborative researches on both development of the simulation technologies and their applications for versatile fields of science and engineering. The researches on modeling, control and computation in simulation have been focused and expected to be applied for various fields including social, economical and financial problems as well as legacy scientific and engineering solution settings. The field reports on new and not-yet-settled problems in real world are also welcome.

Sponsor: JSST; Co-Sponsors: IASTED, CASS, KSS, SCS, IMACS, EUROSIM, MSSANZ; Co-operative Societies: JSCES, JSIAM, JASCOME, SICE, ASJ

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International Steering Committee: S. Takaba (JSST Director of General Affairs), Chair; R. Vichnevetsky (IMACS President), L. Dekker (EUROSIM President), N. Hamza (IASTED Secretary General), A. Lehmann (SCS President), X. Wang (CASS President), D-K. Choi (KSS President), M. H. Kim (Korea), M. Shoji (JSCES), M. Tanaka (JASCOME), K. Furuta (SICE President), M. Zhang (China), H. Chen (China), G. Xiong (China), P. Wu (China), R. Crosbie (USA), S. Hara (JSST Journal Editor on Chief), T. Jakeman (MSSANZ President), M. Nakano (Takushoku University)

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(TIT), M. Yamakita (TIT), J. Ishii (Kinki University), M. Saburi (ETL), I. Watanabe (Seikei University), T. Futagami (Hiroshima Inst. Tech.), M. Sano (Hiroshima City University)

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Topics: Artificial Intelligence * Brain Science * Chaos Complexity * Control & Measurement * Evolutionary Computation * Financial Engineering * Fluidics * Fuzzy Control * Genetic Algorithms * Innovative Computations * Micromachines * Mobile * Vehicle * Neural Networks * Neurocomputers * Risk Handling * Robotics * Virtual Reality * Computational Engineering * Numerical Simulation * Related Fields

Submission of an extended abstract of a paper (A4, 1 page, 3 copies): March 31, 2000 Notification of acceptance of papers: May 20, 2000 Submission of the full text of the paper (4 pages camera-ready manuscript): August 20, 2000

Official language is English

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Comparisons of Simulation Tools and Simulation Technique

Comparison 3 – Maple Closed Model / Numerical Simulation

Maple V is a comprehensive computer system for mathematics, mainly used for symbolic computation, but also including numerical facilities. In this solution these numerical facilities of Maple are, even if the problem would allow to take advantage of a symbolic solution because of the linear periods of the system. Maple's `linalg` and `detools` libraries are needed, so they have to be called at the beginning of the Maple work sheet.

Model description: The differential equations describing the model were implemented in matrix form $dx/dt=A*x$, $x \in \mathbb{R}^3$ and $A \in \mathbb{R}^{3 \times 3}$, with the time dependent matrix $A = A(R(t))$ and the resistivity $R(t)$. The resistivity $R(t)$, an almost rectangular function, with raise-fall time t_{rr} (TRF) of magnitude $1e-15$ seconds and constant periods of magnitude $1e-6$ seconds, was implemented as a continuous function using Maple's `piecewise` and `trunc` commands:

```
t_red:=t-(1e-5)*trunc(t/(1e-5));
R:=piecewise((0<=t_red and t_red<TRF),R1
(TRF<t_red and t_red<5e-6),R2
(5e-6<=t_red and t_red<5e-6+TRF),R3
(5e-6+TRF<=t_red),R4)
```

Task a: The Maple command `eigenvalues(.)` was used to calculate the eigenvalues of $A(t)$ at two different time points, once during the on-period and once during the off-period of the resistivity $R(t)$. Linearization was not necessary because of the implementation of the system in matrix form $dx/dt=A*x$:

```
eigenvalues(subs(t=0,A(t)));
eigenvalues(subs(t=TRF,A(t)));
```

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

Figure 1: Table of eigenvalues

Task b: To simulate this stiff system Maple's function `dsolve` was used. Invoking the `dsolve` function with options `type=numeric` and `method=lsode` causes a numerical solution to be found using the Livermore Stiff ODE solver. The final values of the solution were stored for later use. For the plots Maple's `odeplot` command was called with the `numpoints=500` option to be sure the plotting-procedure does not ignore the current peaks (without this option – forcing a "high-frequency" output – the plots do not show the

peaks exactly and seem to be wrong, although the ODE solver works correctly with step sizes small enough for the rise and fall slope).

The figure after the Maple commands shows the current $I_R(t)$ [solid] in Ampere and the voltage $V_L(t)$ [dotted] in 0.1 Volts.

```
x_sol:=dsolve({deg,init},{x1(t),x2(t),
x3(t),x4(t)},type=numeric,
method=lsode[backdiag], 'itask'=3,
output=procedurelist);
odeplot(x_sol,[t,x2(t)/R],0..1e-4,
numpoints=500):
```

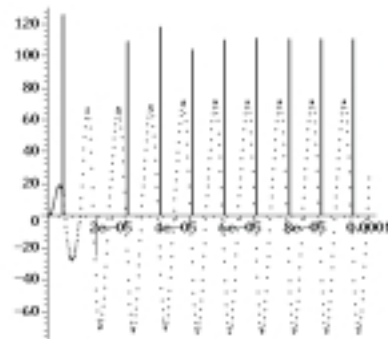


Figure 2: State variables IR and VL as functions of time

Task c: With the new initial condition stored in task b) the simulation using Maple's functions `dsolve` and `odeplot` was repeated four times in a loop, varying the rise/fall time TRF and storing the results to compare them. The same commands were used as in task b). A plot in the phase plain shows the small difference between the three coinciding curves at TRF=1e-15 seconds, TRF=1e-11 seconds, TRF=1e-9 seconds and the one slightly differing at TRF=1e-9 seconds.



Figure 3: Phase plane curves VL3=dx/dt as a function of IL3=x3

All calculations were performed on a Celeron 500 under Linux 2.x and Maple V Release 5.1. The executing of the whole Maple worksheet took about 20 seconds and shows the numerical possibilities of Maple V Release 5.1.

N. Viertl, Vienna University of Technology, vierth@gmx.at

Comparison 3 – MATLAB Hybrid Model / Numerical Approach

MATLAB, a software tool for numerical matrix manipulation, was used for a “hybrid” simulation of the amplifier, using a state space representation of the model in MATLAB. As MATLAB offers now the full features of the ODE suite (before only part of SIMULINK), it was not necessary to build up the model in SIMULINK.

Model Description: A hybrid approach was used for this solution. That means, that each of the four states (rise, off, fall, on) is described by a separate model (state space equations) and the simulation of each state uses the final values of the preceding one as start value. The model (an **m**-file) for the ‘rise’- state looks:

```
function dx = Maus(t,x)
R=Ron + dR*MOD(t, T);
A = [0 -1/L1/L0;
1/C2 -1/(R*C2) -1/C2;
01/L3 -RL/L3 -1/L3;
001/C40];
B = [1;0;0;0];
dx = A * x + B * VDC/L1;
```

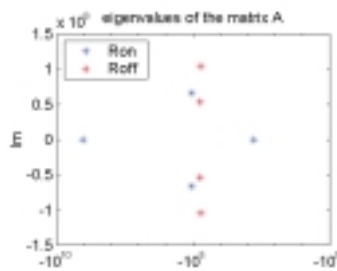
R=Rof for the ‘off’-state, R=Rof-dR*MOD(t-5e-6), T) for the ‘fall’-state, and R=Ron, for the ‘on’-state has to be chosen. In “on”- and “off”-state the equations are linear, but an algebraic solutions is not possible because of the ill-conditioned Matrix A.

Task a. Because for ‘off’ and ‘on’ the differential equations are linear, the matrices A(t) can be used for the calculation of the eigenvalues, with MATLAB’s command eig:

```
Rx=[Ron Rof];
for i=1:2
R=Rx(i);A{i}=[0 -1/L1 0 0; ..] end
eigenvalues_on = eig(A{1})
eigenvalues_off = eig(A{2})
```

In the following the MATLAB output and a root locus plot:

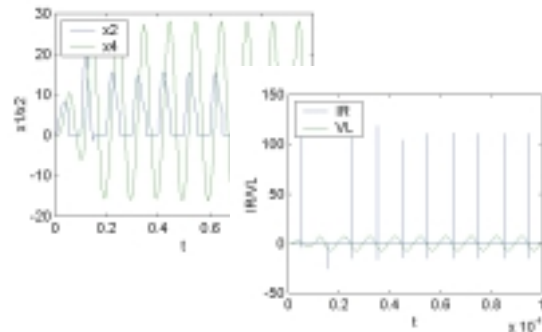
```
eigenvalues_on =
1.0e+009 *
-1.11731759441059
-0.00000062578277
-0.00011303881490 + 0.00065835222047i
-0.00011303881490 - 0.00065835222047i
eigenvalues_off =
1.0e+006 *
-0.05470820246506 + 1.04079719785483i
-0.05470820246506 - 1.04079719785483i
-0.05822841860988 + 0.53275019240597i
-0.05822841860988 - 0.53275019240597i
```



Task b. A loop was run ten times (10 periods=100e-6), in which successively the four different states ‘rise’, ‘off’, ‘fall’ and ‘on’ were calculated. Each calculation starts with the results of the preceding simula-

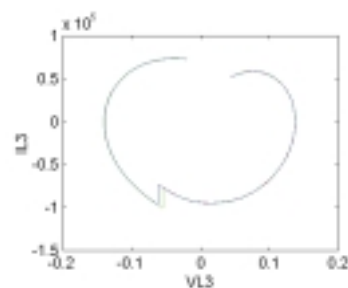
tion. The eigenvalues of the ‘on’-state show that the system is stiff in this state, so that the stiff method ode23s was used for simulation of ‘rise’, ‘fall’ and ‘on’-state; for the ‘off’-state, the algorithm ode45 was accurate enough. Plot results see below.

```
for i = 1:10
P = T*(i-1); % start time of the period
y0 = y2(size(y2,1),:); % results of prec. calc.
[t2,y2] = ode23s('Mrise',[P P+TRF],y0); % sim. rise
t = [t;t2]; y = [y;y2]; % append results t and y
for j = 1:size(t2) % calculates IR
IR = [IR;y2(j,2)/(Ron + dR * MOD(t2(j), T))];
end
% calculate off, fall and on ...
end
```



Task c. Using the final values of task b) as the start values, the parameter study for TRF is performed in a loop. In each loop the four consecutive states are simulated, where the construct y = [y(1:length(y)-1,:); y2] concatenates the results of the previous state. In each run the results are plotted into the same co-ordinate system. The following plot shows that only TRF=1e-7 produces different results than the other values for TRF.

```
trf=[1e-15 1e-11 1e-9 1e-7];
for n =1:4;
TRF=trf(n); dR = (Rof-Ron)/TRF;
[t2,y2] = ode23s('Mrise',[0 TRF],y0c); % rise
y = y2;
y0 = y2(length(y2),:); % last value from rise
[t2,y2] = ode23s('Moff',[TRF 5e-6],y0); % off
y = [y(1:length(y)-1,:);y2];% append results to y
y0 = y2(length(y2),:);
[t2,y2] = ode45('Mfall',[5e-6 5e-6+TRF],y0);%fall
y = [y(1:length(y)-1,:);y2];
y0 = y2(length(y2),:);
[t2,y2] = ode45('Mon',[5e-6+TRF 9e-6],y0); % on
y = [y(1:length(y)-1,:);y2];
x3=y(:,3); dx3=y*[0;1;-RL;-1]*1/L3; % calc X3,dx3
plot(x3,dx3) % plot the results
hold on % without deleting the other plot
end
```



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Comparison 5 – MATLAB Hybrid Model / Numerical Simulation

The Simulator: MATLAB is a widely used software tool based on numerical vector and matrix manipulation, offering also algorithms for solution of ODEs. For this solution we just used MATLAB and didn't take advantage of MATLAB's extension SIMULINK for graphical modelling.

Model Description: The MATLAB algorithm ode15s was used to solve the system numerically and to calculate the times of the discontinuities by calling this solver's state event finder. These tasks are done simultaneously with high accuracy. Each time a switching time instant was encountered, the ODE solver stopped and the values of c_2 and c_4 were changed. Then the solver was restarted beginning at the discontinuity. MATLAB is no comfortable simulator of CSSL type, it is more of programming language type. In order to call the ODE solver, differential equations, event function and initialisation have to be described within functions (stored as **m**-files).

```
% - differential equations - %
function dy = f(T,Y)
global c1 c2 c3 c4
dy = [c1*(Y(2)+c2-Y(1)); c3*(c4-Y(2))];
%- state event finder -%
function [value,isterminal,direction] = events(T,Y)
global p d
value = Y - [p;0];
isterminal = [1;1]; direction = [d;1];
%- initial values - %
function [tspan,Y0,options] = init
tspan = [0; 5];
Y0 = [4.2; 0.3];
options = odeset('Events','on');
```

A basic call of the ODE solver looks like

```
[T,Y,TE,YE,IE] = ode15s('varfunction',
[tstart 5],Y0,options);
```

The left side represents the solution vector with time vector **T**, state vectors **Y**, time of event **TE**, state values of the event **YE**, and event indicator **IE**. At the right side the solver is called with four arguments. While [tstart 5] (time interval for solution) and Y0 (initial values for state Y) are simple, 'varfunction' and options are very complex. options is a MATLAB structure, which manages most of the parameters of the ODE solver, e.g. accuracy, event flag, ... 'varfunction' is managed by the ODE solver itself, expecting differential equations, initial settings, state event function, mass matrix, etc. The user has to provide a switching function for this purpose, according to the structure of the model:

```
function varargout = varfunction(T,Y,flag)
global c1 c2 c3 c4 p n %
switch flag
case '' varargout{1} = f(T,Y);
% Return dy=f(T,Y).
case 'init' [varargout{1:3}]=init;
% Return default initials
case 'events' [varargout{1:3}] = events(T,Y);
% Return event function
```

Task a,b): Based on the model description given before, the following commands build up a loop from initial time to event times until final time (hybrid model separation with respect to events):

```
d=1; p = 5.8; a=1e-6; c1=2.7E+6; c2=0.4;
c3=3.5651205; c4=5.5;
options = odeset('reltol',a,'abstol',1e-14,
'events','on');
Y0=[4.2; 0.3]; c2=0.4; c4=5.5;
yout=Y0.'; tout=0; teout=[]; yeout=[]; ieout=[];
tstart=0;
while tout(length(tout))<5
[T,Y,TE,YE,IE] = ode15s('task',[tstart 5],Y0,options);
laenge=length(T);
if Y(laenge)>=5.8
p=2.5; d=-1; c2=-0.3; c4=2.73; end
if Y(laenge)<=2.5
p=5.8; d=1; c2=0.4; c4=5.5; end
tout=[tout;T(2:laenge)]; yout=...
teout=[teout;TE]; yeout=...; ieout=...;
Y0=[Y(laenge,1);Y(laenge,2)];
tstart=T(laenge);
end
```

It has to be underlined that the solver ode15s, a backwards differential algorithm with stepsize control order control, root (=event) finding algorithm and efficient accuracy control indeed gives very accurate results, as far as the parameters are trimmed appropriately. With relative accuracy 10^{-10} the solver gives the final value $y_1(t=5) = 5.40564067901279$, with following time instants of events:

0.00000024628777	1.10830616778130	2.12968535517347
3.05415290702449	4.07553209441652	4.99999964626755

Task c): Varying the relative accuracy is simply done by looping around hybrid overall model given above. As minimal relative accuracy $2.2 \cdot 10^{-14}$ can be reached (absolute accuracy 10^{-14}). The final values $y_1(t=5)$ are given in the following table:

10^{-6}	10^{-10}	$2.2 \cdot 10^{-14}$
5.79997428289423	5.40564067901279	5.36934647891853

Task d): As the model description is parameterised appropriately, only re-running of task a, b is necessary, setting different values for the parameters c_2 and c_4 and the switching condition $y_1 > 4.1$. There are many discontinuities, the last one being detected at 4.93646389261271. The final value $y_1(t=5)$ is 5.78040252702804 (plot results see fig. 2).

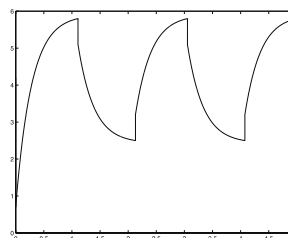


Fig 1: $y_1(t)$, task b

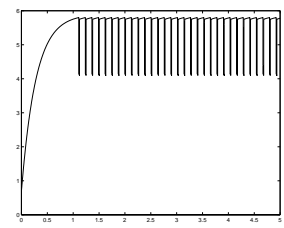


Fig 1: $y_1(t)$, task d

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Comparison 9 – Maple Discrete Model / Algorithmic Control

Maple VR5 is a computer algebra system with embedded numerical algorithms. Throughout this combination between symbolical and numerical methods it is an interesting computer program for the use in the field of simulation.

Model description: In this model, a nonlinear ODE in two dimensions describes the liquid levels x_1 and x_2 . The right hand side of the ODE set is defined in MapleVR5 the following way:

```
F:=(x1,x2)-0.06624*0.4*sqrt(abs(x1-x2))*sign(x1-x2);
diff_x1:=(x1,x2,u)->0.067*u-f(x1,x2);
diff_x2:=(x1,x2)->f(x1,x2)-0.0605*
    piecewise(x2<16,1.2,1)*0.3*abs(x2)^(0.48);
```

In above MapleVR5 statements the construct of a `piecewise` function is used. First, such piecewise defined functions can easily be defined, and second the integration routines are able to deal with piecewise functions symbolically. The integration results of piecewise functions can be converted to the Maple internal representation of piecewise functions, being therefore optimally prepared for further calculations. So it looks that Maple provides useful techniques for solving this comparison, because the `piecewise` function construct would optimally support membership functions of given type.

Task a) First the membership functions for the variables ex_2 , x_1 and u are constructed with the `piecewise` statement. This is done in a straight forward manner and contains no difficulties. The next step is the definition of the rules-table for the fuzzy controller FC1. On a first attempt, the table is implemented directly:

```
Output:=(x,y,z)->
    max(min(x1_n1(x,ex2_p3(y))*up8(z),
    ... ));
```

Only the first two elements of the rules-table are shown, the other entries are implemented the same way. Although Maple is able to integrate the rules-table for a specific point (x,y) , the time to evaluate the integral is too long, it is in the range of 20-30 seconds for one point (x,y) . The symbolical/analytical treatment of the membership functions is not successful.

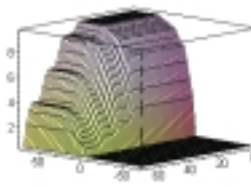
A better performance can be reached if the special structure of the membership functions is utilized. Only neighbouring membership functions can cross each other and if there exists a crossing point, it is unique. Therefore, for each neighbouring pair 4 cases must be distinguished to determine the rules-table output function. So we collect the weighting functions for each membership function of u and determine, with the Maple Statement `solve`, the crossing point, if it exists. A next step to improve the performance is to integrate those weighted membership functions one after another.

So this "manually programmed" algorithm works the following way: First store a list of weighting functions for each membership function of u . Then, for each function u , determine which of the two relevant weighting functions are

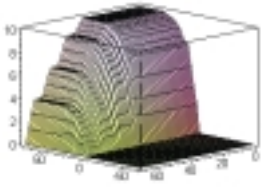
equal to zero. If one of them is equal to zero, the contribution of the other one to the final result can be computed, that is integrated numerically. If every of the two weighting membership function is not equal to zero, determine the crossing point and compute the contribution to the final result. As a last step sum up the intermediate results. So every step, fuzzification, inference and defuzzification had to be implemented directly in order to get performance.

With this algorithm the three dimensional fuzzy controller surface for FC1 is computed in about 55 seconds on a Pentium 300MHz with 64MB RAM:

Above algorithm can be adopted for each controller in an easy way. The calculation time for FC2 was about 26 seconds (much faster, because no integration is necessary for singletons) and for FC3 62 seconds.



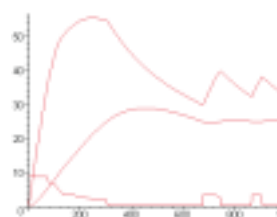
Fuzzy Controller FC1



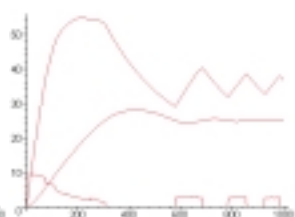
Fuzzy Controller FC2

Task b) The simulation of the whole system solves the ODE with an explicit Euler-algorithm of fixed step size 1. Due to the discrete controller with a sample time of 1ms it is sufficient to use a simple Euler-algorithm in between the samples. Below the graphs of x_1 , x_2 and u versus time are shown, simulation times appear in an range of 200 and 150 seconds for FC1 and FC2, resp. (plot results for FC1 below).

Task c) As interference is implemented manually, weighting rules are implemented as simple matrix multiplication (giving the same computing time as for FC2, plot results see below).



Simulation with FC1



Simulation with FC3

Conclusion: Although MapleVR5 has the possibilities for symbolic transformations of piecewise defined functions, the resulting equations are too big for efficient evaluation using this comparison. Further internal information must be used to solve this comparison. The nature of this task is primarily numeric, so that Maple cannot show its possibilities in symbolic computing.

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Comparison 9 – MATLAB / SIMULINK Continuous Model / Algorithmic Control

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, but not used in this solution.

Model Description: The two tank system described by 3 equations and 1 if-then condition is modelled primarily in SIMULINK subsystem two tank system:

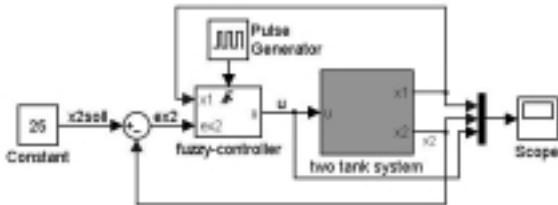


Fig. 1: SIMULINK model with two subsystems

Although MATLAB/SIMULINK offers a module for easy implementation of general fuzzy controllers, in this solution the fuzzy controller was programmed directly in MATLAB, taking into account the special shape of the membership functions. One reason was the aim to get “almost exact” results. Unfortunately MATLAB's fuzzy module discretises in any case during fuzzification and defuzzification and approximates the integral in defuzzification. The discretisation and approximation error cannot be neglected, especially in case of discontinuous or non-differentiable membership functions (the case in this model).

The function, which is representing the fuzzy controller, starts by fuzzyfication of the inputs x_1 and ex_2 . A small excerpt follows:

```
%Membership function ex2: p2
if ex2>=10 & ex2<=20
ex2mb(4)=(ex2/(20-10)- 10/(20-10));
elseif ex2>20 & ex2<=40 ex2mb(4)=(ex2/
(20-40)-40/(20-40));
else ex2mb(4)=0;
end %represents a triangle function
```

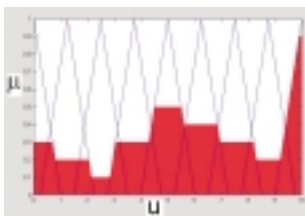


Fig. 2:
Weighted output membership functions

In the next step the interference algorithm is implemented which is the same in all FCs. The big differ-

ence between the FCs is to be found in defuzzification: although in all controllers “center of gravity” was used, FC2 was much easier to program than FC1, because FC2 works with a singleton membership function (integration is not necessary), as shown in the following lines:

```
u=(0*wn1+1.25*wp1+2.5*wp2+ ...
+10*wp8)/(wn1+wp1+ ... +wp8); %FC2
```

In FC1 the trapezoidal integration was used sufficient due to the fact that all membership functions are piecewise linear. A special function was established to calculate μ , the weighted output membership function before defuzzification, which will be activated in the fuzzy controller function (exact algorithm, fig. 2). The subsystem fuzzy controller (fig. 1) represents a discrete controller, implemented by a triggered subsystem, triggered by a pulse function (sampling time 1sec).

Task a: It turns out that the computation time of FC1 was much longer than of FC2 ($t_{fc1}/t_{fc2}=85.7$) – because of simple calculation of defuzzification by means of singletons, the results look similarly (fig. 3).

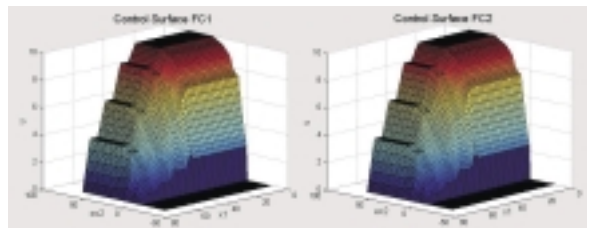


Fig. 3: Control surfaces for FC1 and FC2

Task b: After simulating the system with both controllers, again FC2 was faster, but the controller is switching more often (fig. 4, fig. 5). A similar high computation time ratio of 10.4 was calculated.

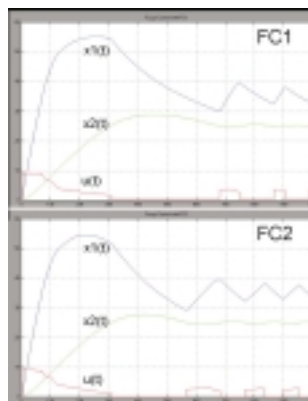


Fig. 4 / 5: States and controls for FC1 and FC2 over time

Task c: Implementation of a weighting rule is a simple matrix multiplication, giving FC3. Due to the minimal change of FC1, simulation time didn't change and the FC3 results look like FC1's. It seems that the addition of the weighting matrix has almost no effect on the solution.

Computer system: AMD K6-2/450MHz, 128MB RAM

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Comparison 12 – Maple

Analytical Simulation / Time-oriented Model

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: In this case the symbolic solutions of the differential equations are used in order to calculate the exact collision times. A recursive Maple-procedure is implemented, which calculates exactly the next collision and calls itself with the changed initial values or computes the end values if no further collision occurs.

```
> dist_funcs := proc(...)
...
> if (y_11>=0) and (y_21>=0) and (y_31>=0) then
> RETURN(...):
> fi:
> col_12:= min(solve(y_1(t,t_0,y_10,y_11)=0,t),t_end):
> col_23:= min(solve(y_2(t,t_0,y_20,y_21)=0,t),t_end):
> col_34:= min(solve(y_3(t,t_0,y_30,y_31)=0,t),t_end):
...
> t_new:=min(col_12,col_23,col_34,t_end):
> if (t_new=t_end) then
> RETURN(...)
> fi:
> if (t_new=col_12) then
... (Collision 1-2)
> elif (t_new=col_23) then
... (Collision 2-3)
> else
... (Collision 3-4)
> fi:
> dist_funcs(...):
> end:
```

Task a. That procedure can be used easily to plot the distance functions and also to calculate the final velocities for different collision coefficients. A numerical method is used to find the quasi-plastic case at $e=0.15999999999999984000$.

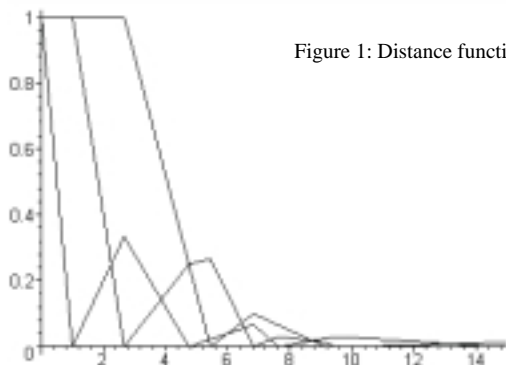


Figure 1: Distance functions

```
> v1e(1), v2e(1), v3e(1), v4e(1);
0, 0, 0, 1
> v1e_equ:=proc(ee) v1e(ee)-0.25; end:
> e_equ:=fsolve(v1e_equ,0.14..0.18);
e_equ := 0.15999999999999984000
> v1e(e_equ), v2e(e_equ), v3e(e_equ), v4e(e_equ);
0.25, 0.25, 0.25, 0.25
```

Task b. The number of collisions is equal to the number of recursive calls to the procedure `dist_funcs`. Compared with numerical methods this symbolic solution allows to compute the number of collisions for smaller values of the restitution coefficient.

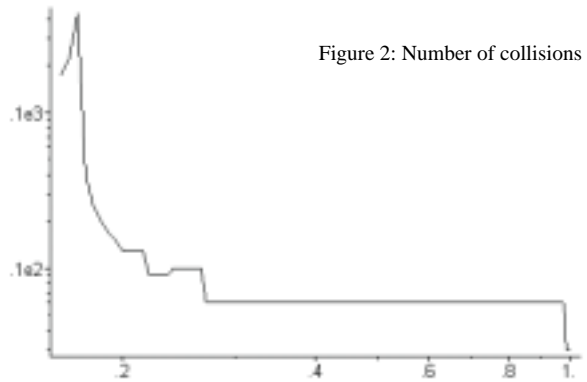


Figure 2: Number of collisions

Task c. Again the same method as in task a is used to calculate $e=0.5874010519682$ as restitution coefficient to reach a final velocity $v_4=0.5$.

For the stochastic task a sample of 1000 values for e were generated and the according final velocities computed. Using standard commands of MAPLE mean and standard deviation of the sample are calculated.

```
> e_vals:= [random[normald[0.5,0.05]](1000)]:
> v4_vals:= [seq(v4e(e_vals[i]),i=1..1000)]:
> mean(v4_vals);
0.42151682203965855946
> standarddeviation(v4_vals);
0.042111567150847819106
> [v4_m-...,v4_m+...];
[0.338979667091457, 0.504053976987860]
```

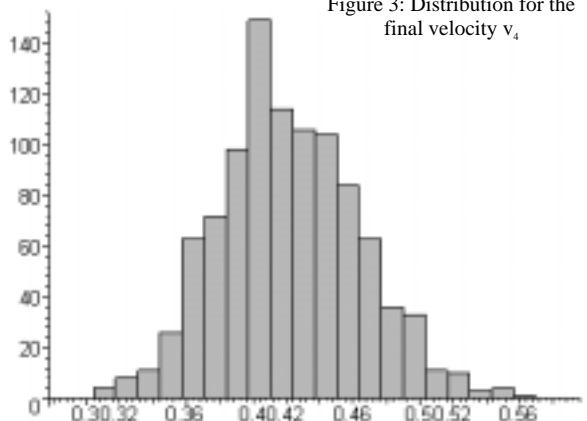


Figure 3: Distribution for the final velocity v_4

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Comparison 12 – MATLAB Numerical Simulation / Time-oriented Model

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

Model description: Although the system is piecewise linear a numeric approach was chosen. MATLAB provides various functions for integration of differential equations which can also detect state events. This feature was used here. The dynamic system was integrated with the `ode23` function and a termination criterion was supplied for the case of collision. Each time the distance between two balls reaches zero integration stops and control is handed back to the calling function.

```
function varargout = ...
    compl2(t,y,flag,varargin)
switch flag
case '.'
    varargout{1} = f(t,y);
case 'events'...
    [varargout{1:3}] = events(t,y);
...
end
function dydt = f(t,y) % dynamic system
dydt=[y(2);0; y(4);0;y(6);0;y(8);0];
function [val,isterm,dir] = events(t,y)
val = [y(3); y(5); y(7)]; % distances
isterm = [1; 1; 1]; % each col. Terminates
dir = [-1; -1; -1]; % decreasing distance
...
```

Depending on which balls collided, velocities are changed and the integration is started again (unless the termination criterion is met). The output graph (see Fig. 1) is drawn online and is useful during debugging.

```
while (y0(4)<0 | y0(6)<0 | y0(8)<0)
    [t,y,te,ye,ie] = ode23('compl2',
        [tstart tfinal],y0,options,span);
    % on collision set new initial conditions.
    if ie == 1 % ball one and two
        y0(2) = y0(2)+(1+e)*0.5*y0(4);
        y0(6) = y0(6)+(1+e)*0.5*y0(4);
        y0(4) = -e*y0(4);
    elseif ie == 2 % ball two and three
        y0(4) = y0(4)+(1+e)*0.5*y0(6);
    ...
end
yout(size(yout,1),:) = y0;
tstart = t(nt);
end
```

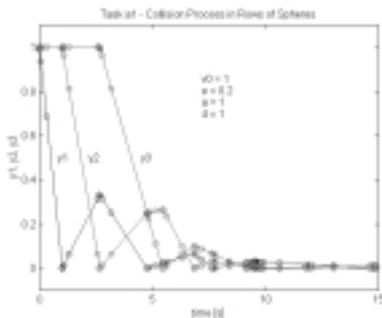


Fig. 1: Distance between balls

Task a: The distance time function for $e=0.2$ is shown in fig. 1. Integration steps are marked by small circles. For $e=1$ the final velocities are $v_{x_1} = v_{x_2} = v_{x_3} = 0$ and $v_{x_4} = 1$. The quasi plastic case leads to

$v_{x_1} = v_{x_2} = v_{x_3} = v_{x_4} = 0.25$, 0.171577 was the smallest computable value for e . Smaller values result in numerical errors.

Task b: Figures 2 and 3 show the numbers of collisions and final velocities v_4 for simulation runs with e varied from 1 down to 0.171577.

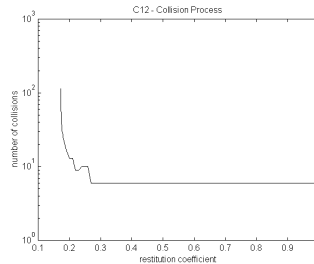


Fig. 2: Number of collisions

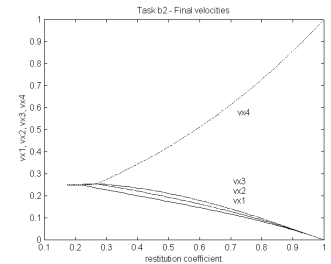


Fig. 3: Final velocities v_4

Task c: For this task MATLAB Toolbox functions have been used: `fminbnd` from the optimisation toolbox was used to find $e = 0.5873955$ for $v_{x_4} = 0.4999948$ and `normfit` from the statistics toolbox was used to find maximum likelihood estimators for mean and standard deviation and the corresponding confidence intervals: mean=0.4271 [0.4244, 0.4298], standard deviation=0.0436 [0.0417, 0.0456]. Figure 4 shows the clearly non symmetric histogram for a sample of $n=1000$.

```
% define function to be minimised
f=inline('abs(c12odetaskc([],[]),'c12'',e)-0.5'),'e');
% minimise f with 0.2 < e < 1
e=fminbnd(f,0.2,1);
% sample with normally distributed e
for i = [1:1:1000]
    e = normrnd(0.5, 0.05);
    vx4 = compl2([],[],'c12'',e);
    vx4out = [vx4out; vx4]; end
[mu,stdv,muci,stdvci] = normfit(vx4out);
histfit(vx4out,35);
```

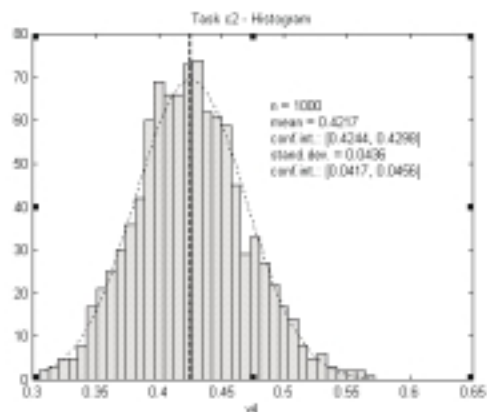


Fig. 4: Histogram, e normally distributed (0.5, 0.05)

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3rd MATHMOD Vienna

3rd IMACS Symposium on Mathematical Modelling

During February 2-4, 2000 the third international IMACS symposium took place at Vienna University of Technology. This event was sponsored also by Technical University Vienna and cosponsored by IFAC (Int. Fed. for Automatic Control), IAMCM (Int. Ass. for Math. & Comp. Mod.), ASIM (German Speaking Simulation Society), GAMM (Soc. Appl. Math. Mech., Germany), VDI/VDE-GMA (Soc. for Meas. & Autom. at VDE), OCG (Austrian Computer Soc.), OEMG (Austrian Math. Soc.), EUROSIM (Fed. European Simulation Soc.).

The conference gathered 210 scientists from 25 countries from four continents. This interest in a topic like this is due to an increasing need for reliable formal models. In some disciplines, use of mathematical models is a rather new approach to problem solution whereas in other disciplines mathematical models are used since a long time but need continuing adaption and refinement. The possibility to solve a certain problem and the quality of a solution of a certain task depend essentially on appropriate modelling of the question and of all available information. In some cases, the system under investigation and its behaviour are understood rather well. In such cases an appropriate model will assist in finding a good solution of the problem to be solved. In other situations, such a model is primarily intended to help for a better understanding of what is going on in the system. Examples for the first case are many types of design problems being encountered in typical engineering systems, such as controller design, design of a production line etc. whereas the request for an improved understanding is often found in connection with non-engineering systems such as biological or medical systems, economic or environmental systems and their control etc.

However, the area of application determines to a certain extent the knowledge of basic modelling principles, preferences of modelling approaches, of methods for model simplification or for parameter estimation etc. Moreover, many things are discovered repeatedly. Therefore, a conference having mathematical modelling as its center will allow for a fruitful and stimulating exchange of ideas – be it the exchange between different areas of applications or be it the exchange between theory and practice. Therefore, the third IMACS symposium on Mathematical Modelling (3rd MATHMOD) is devoted to the discussion of theoretic aspects of modelling and to the mathematical (or formal) mod-

elling of all type of systems no matter whether the system is

- * dynamic or static
- * deterministic or stochastic
- * continuous or discrete
- * lumped parameter or distributed parameter
- * linear or nonlinear
- * or of any other nature.

Consequently, a wide variety of formal models was discussed and the term “mathematical model” includes classical models such as differential or difference equations, Markov processes, ARMA models as well as more recent approaches such as Bond graphs or Petri nets. In order to allow for a fruitful exchange of ideas across traditional borderlines, five survey lectures were given on topics of current interest (the report follows the sequence of their presentation and does not indicate any evaluation).

Engineers and scientists with some experience in modelling and in the use of models know well that a good physical understanding of the modelling is not only important for the modelling process and for model adaption but also for appropriate use of a model. Growing complexity of models leads to the need of using submodels provided by other engineers and scientists and in most cases such submodels will be described and documented in a language suitable for the use of digital computers and hence, the mechanical, electrical etc. context is hard to be seen. On the other hand, it is well known and widely accepted that the quality of the solution to a problem depends on the degree of understanding of the real world process. A good understanding of the e.g. physical background will stimulate the imagination of the problem solver. This topic was addressed by D. Karnopp from Davis, USA, in his talk on “Retaining analog intuition in a digital world with Bond graphs”.

A further challenge to all interested also in more theoretical aspects of modelling is the problem of model equivalence and on model based systems analysis in order to answer questions about e.g. model reduction or controllability of a system. Engineers and scientists know since long that for a given system one and the same quantity (variable) can be considered as input or as output depending on the problem under investigation. J. C. Willems from Groningen, NL, presented his ideas on modelling a (sub-)system as a box with terminals which carry manifest variables in his talk on “Modelling dynamical systems using manifest and latent variables”. Auxiliary (latent) variables may be necessary to establish a model. The modeller is in-

terested only in manifest variables what leads to the question whether or not elimination of all latent variables is possible and – as a consequence – when two models of a given system can be considered to be equivalent.

The problem of determining a system's input from observations of certain outputs has a long history and is yet still of interest for engineers. D. J. Murray-Smith from Glasgow, UK, addressed in his talk on "The inverse simulation approach: a focussed review of methods and applications" this topic from the point of view of applications. Methods and algorithms are reviewed, which the speaker believes to have wide applicability across a number of fields and which have received attention in various fields of application. Moreover, the potential of this approach for the important external validation of a simulation model is emphasized.

Computer algebra systems become more and more important for solving real-life problems by using modelling and simulation. Nowadays, their power allows to handle very complex (nonlinear) systems analytically i.e. symbolically so that solutions may be gained without time-consuming calculations in other domains (e.g. time domain). This holds also for the determination of optimal parameters in distributed parameter models,



what is also shown in this forth survey. S. Braun from München, D, addressed this topic in his talk on "Applications of computer algebra simulation (CALs) in industry".

The last survey highlights the influence of the modelling goal on the resulting model's complexity. This lecture by P. M. Frank from Duisburg, D, on "Modelling for fault detection and isolation versus modelling for control" emphasizes the particularities of models for fault detection and isolation (FDI) in contrast to models used for control. Of special interest is the question of complexity of the model, which, of course, depends basically on the given situation. However, it is shown that FDI-models – contrary to widespread opinions – may be even less complex and

precise because they can restrict to only those parts of the system in which the faults occur and to those phenomena that carry information of the faults of interest. This issue is discussed in terms of different model-based FDI approaches – analytical, knowledge-based and data-based.

To improve the aforementioned exchange of ideas further, 15 well-known scientists followed the invitation to organize a so-called special session where not only those interested in a more specialized topic could meet and exchange ideas but also colleagues with a different area of specialization could get a good impression on the most recent research topics in this particular area(s). In addition, the Call for Papers invited scientists to contribute individually. As a result, some 180 extended abstracts were submitted and were carefully reviewed by the 33 members of the International Program Committee (chaired by Inge Troch) coming from 17 countries worldwide. This reviewing resulted in invitations to some 140 authors to present their contribution during the conference as a paper or a poster, respectively. Unfortunately, not all these authors were able to participate in the 3rd MATHMOD conference. Nevertheless, the scientific program contained 105 contributed plus 84 papers presented in a special session i.e. a total of 189 regular papers which were collocated and arranged in 11 strings of sessions according to their main thematic point:

- * Control Systems
- * Engineering Applications
- * Mechanics and Mechatronics, incl. Robotics
- * Biotechnical and Chemical Engineering
- * Biology and Medicine
- * Descriptor Systems
- * Bondgraphs
- * Discrete Systems
- * Methods and Theoretical Aspects
- * Software and Softcomputing
- * Education



The organizing committee, Inge Troch, Felix Breitenecker and Friedrich Urbanek, was careful to provide enough time for scientific and other discussions. Hence, there were not only sufficiently long coffee and lunch breaks where participants could meet and talk or could have a look on the books and

journals on display or on the 23 posters. These posters could be discussed with the authors during these breaks but especially during the special Poster Session where also a selection of the 'best poster' took place. S. Wieshofer and her co-author K. Kleemayr with their poster on "Modelling of the seasonal snow cover" were the winners of the best poster award consisting of a one year subscription to the journal "Mathematical and Computer Modelling of Dynamical Systems". A second one-year subscription of this journal was disposed of by lot among those conference participants who played an active part in this selection. Further, four one year subscriptions of "Simulation News Europe" (SNE) were handed over as second and third prizes for poster presentations and participation in the selection, respectively. Inguna Ruza also won a best poster award. An extended version of her presentation "Dynamic Modelling Approach for Latvian Rural Communities" is printed as essay in this issue of SNE.

The written versions of the five invited lectures, of all contributions to the conference as well as abstracts of all posters are collected in a Proceedings volume (ISBN 3-901608-15-X), edited by I. Troch and F. Breitenacker and published by ARGESIM, Vienna. Moreover, the survey lectures and some regular papers will appear also in a special double issue of the IMACS journal "Mathematics and Computers in Simulation". Further, it is intended to publish also some papers in a special issue of the "Journal of Intelligent and Robotic Systems" (JIRS) and to invite some authors to submit a suitably enlarged and adapted version of their contribution to "Mathematics and Computers in Simulation" (MCMDS). For any of these possibilities, selection of papers is based on a second reviewing procedure based on full papers.

Moreover, a rich social program during the three conference evenings – a Get-Together-Party on the eve of the symposium, a cocktail party in the beautiful *Senatssitzungssaal* of the town hall of Vienna and a traditional (and really Viennese) *Heurigen* evening in *Nussdorf* – offered further possibilities to make friends



with colleagues from other countries or, sometimes also from one's own town.



Finally, it should be mentioned that there were also several committee meetings during or immediately after the conference. Among them was a meeting of the IMACS TC-2, the IMACS Technical Committee on "Mathematical Modelling". There the recommendation was given to organize – in view of the growing interest in a conference like this – a 4th MATHMOD conference at TU Vienna during the first week of February 2003.

Inge Troch, Vienna

WSC '99 Sets New Precedents and Records

The 1999 Winter Simulation Conference (WSC) was held December 5-8, 1999, at the Pointe Hilton Squaw Peak Resort in Phoenix, Arizona, U.S.A. The conference theme was "Simulation – A Bridge to the Future"; and by many criteria, the conference was one of the largest and most successful in WSC's history. Featuring 217 full-length technical papers, 4 panel discussions, and 24 software tutorials, the program set a new record for the number of presentations. Total paid attendance for WSC '99 was 673, including 162 attendees based outside the United States.

The WSC '99 program began on Sunday, December 5, 1999, with 6 vendor training sessions, the Poster Session featuring 17 posters, and the Ph.D.-Student Colloquium featuring 15 student speakers. At the Opening Session of WSC '99 on Monday, December 6, the INFORMS-College on Simulation (INFORMS-CS) presented its "Lifetime Professional Achievement Award" to Dr. Alan Pritsker; and Dr. Jon Anton gave the keynote address entitled "The Use of Simulation in Call Center Optimization." Following the Opening

Session, a coordinated sequence of Introductory, Advanced, and Software Tutorials attracted many attendees. In addition there were tracks devoted to the following areas: Analysis Methodology; Modeling Methodology; Manufacturing Applications; Semiconductor Manufacturing; Construction Engineering and Project Management; Military Applications; Logistics, Transportation, and Distribution Applications; Business Process Simulation; Future of Simulation; Healthcare; and Special-Focus Presentations. The Exhibit Area was very popular with attendees, and this year it gained several new commercial and professional-society exhibitors. Demonstrations of the latest simulation software and hardware were available in the Exhibit Area along with examination copies of numerous simulation books and periodicals.

Totaling 1754 pages, the *Proceedings of the 1999 Winter Simulation Conference* was published in both compact-disk (CD) and hard-copy (paper) versions. In response to the growing popularity of electronic publications, the CD was the standard version of the WSC

'99 *Proceedings* supplied to all attendees; and the paper version was made optional for the first time. To provide all attendees with a complete hard-copy guide to the conference, the WSC '99 *Final Program* was substantially expanded to include abstracts of all posters and *Proceedings* papers without sacrificing the convenience of the *Final Program* as a pocket-size document. Shortly after the conference, abstracts and full papers for the complete WSC '99 *Proceedings* became freely available on the INFORMS-CS website www.informs-cs.org; and a similar arrangement for future WSCs ensures that WSC authors will benefit from the fastest and most extensive possible dissemination of their work throughout the world.

For information on WSC '00, visit the conference website www.wintersim.org or contact the General Chair, Paul Fishwick (e-mail fishwick@cise.ufl.edu), or the Program Chair, Keebom Kang (e-mail kkang@nps.navy.mil).

James R. Wilson

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Organisation: The Institute is named after the greatest Slovenian physicist, who was active at the end of the last century (does the Stefan-Boltzmann radiation law sound familiar?). It was founded in the late 1940s with a strong emphasis on nuclear-related programs. Since then, its research activities have spread throughout many basic scientific and engineering disciplines, now engaging over 500 researchers organised in some 20 departments. Along with its commitment to high-quality research, the Institute also plays an important role in educating generations of young researchers and disseminating expertise to the industry.

The Department of Computer Automation and Control belongs to that part of the Institute which has been noted for accomplishments in applied research. In particular, the Department has significantly contributed to promoting modern control engineering in the solving of industrial automation problems at various levels. Many years of “filling the gap” between theory and practice have resulted in a new paradigm of control systems engineering based on the “life cycle” approach. The key idea is in holistic consideration of the various aspects of design, implementation and utilisation of computer automation systems; in other words, all is done in a unified and systematic way. To provide firm support to the life cycle approach, the group has been fostering several disciplines under the common umbrella of model-based problem solving. The following is an excerpt of those activities.

Model-based control and optimisation represents a research area where process models are used as an inherent part of a control strategy that helps to achieve the desired production requirements (product quality and quantity, low energy consumption, environmental requirements). Within this frame, different control concepts and algorithms are developed: flexible recipe control for optimisation of batch processes, non-linear estimation algorithms for combined state and parameter estimation, and non-linear model-based predictive control based on Wiener model. In model-based control the quality of the designed model plays a decisive role in the achieved control performance. Therefore, much effort is put into designing an appropriate process model. Consequently, different modelling techniques (theoretical modelling, experimental modelling) along with novel model representations (hybrid models, neural-network models) are combined to use different sorts of knowledge and information about the process. Special attention is also paid to model validation. The developed control concepts are applied to the control of industrial and pilot-plant processes from the chemical industry and biotechnology. Wastewater treatment represents an important application area in the latter field.

Self-tuning and adaptive control: In this area focus is placed on realisation of algorithms able to achieve the high-

est performance with minimum prior knowledge and experimental effort. A major innovation concerns the tricky adoption of a non-parametric modelling approach (the so-called moment method) to the control design criterion (optimum magnitude). It is shown that all the necessary information to optimally tune the PI(D) controller can be “unpacked” from a simple open-loop step response. The resulting controllers typically feature quick response with almost no overshoot, thus outperforming most of the known tuning techniques.

Fault diagnosis: The underlying research concerns algorithms and tools with the aim of contributing to better process supervision and maintenance. Interesting contribution has been done in the domain of fault isolation. In that respect, a modified Dempster-Shafer approach, which belongs to a class of approximate reasoning techniques, is adopted. Major innovation refers to the so-called strength of conflict, which is but a portion of the belief resulting from conflicting evidence within data. Reason for that might be modelling error, process noise or unforeseen faults. As such, it cannot be assigned to any known fault candidates. Strength of conflict is interpreted as a measure of confidence to the weighted list of fault candidates. Higher it is, the less confident one should feel about the suggested list. This is an extremely useful indicator for operators. The underlying results are implemented in an fault detection and isolation toolbox available in the Matlab and G2 environments.

Model-based software engineering represents, apart from the life-cycle approach, the key principle of systematic development of systems of industrial automation. Since such systems are normally software-intensive, the key objective is to yield software of the highest quality by utilising the domain knowledge base. The main items of the knowledge base are generic architecture, the domain conceptual model, reusable components, process definition, automatic process support and, finally, standards for development, testing and integration. Until now, analysis and design of models for the process control domain have been developed on the basis of the paradigm of extended interdependent finite state machines. The automatic generator of those parts of the specifications related to equipment entities is now in the coding phase. The focus in the near future will be on realisation of automatic reusability of the procedural control part of the architecture, as well as on extension of the domain-engineering context to other life-cycle phases.

Industrial applications: These activities are mostly related to chemical and process industries. The reference list is rather long, including automation of the TiO₂ production process, glue production plant, adaptive control of a plastic extruder and a number of specially designed HW modules for measurements and control.

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Book Reviews

**Hyperbolic Problems:
Theory, Numerics, Applications
Seventh International Conference in Zürich,
February 1998 (Vols. I+II)
Fey, R. Jeltsch (editors)
Birkhäuser, Basel, 1999
ISBN 3-7643-6080-1, 502 +xviii pages (Volume I)
ISBN 3-7643-6087-9, 508 +xx pages (Volume II)**

Published within the scope of the “International Series of Numerical Mathematics”, the proceedings ISNM 129&130 contain about hundred contributions presented last year at a conference on hyperbolic problems held in Switzerland.

When first leafing through the over thousand pages, one gets an impressive overview concerning the diversity of current research work done within this special branch of PDE modeling, which more and more seems to focus on complex and nonlinear problems, enabled by the increasing power of modern computer systems. While theoretical contributions among others are dealing with mathematical aspects as uniqueness, global existence, asymptotic behavior, stability and instability considerations etc., various papers devoted to numerical analysis obtain results in respect of stability and convergence of numerical schemes or submit new techniques in treating specific problems, i.e. algorithms for discontinuities such as shock waves, interface fitting or high-order approximations to multidimensional systems. The results presented in all these contributions cover a surprisingly wide range of applications, such as nonlinear waves in solids, computational fluid dynamics from small-scale combustion to relativistic cosmological problems as well as multi phase phenomena and geometrical optics, which makes the proceedings interesting for everyone interested in continuous simulation.

The editors preferred the publication merely by alphabetical order of the authors. Taking the variety of topics – ranging from theoretical proofs to applied simulation results – into account, a further structuring would have helped the reader in quicker finding those contributions of his particular interest and thus have been desirable indeed.

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**Optimal Control of Partial Differential Equations
International Conference in Chemnitz, Germany,
April 20-25, 1998
K.-H. Hoffmann, G. Leugering, F. Tröltzsch
Birkhäuser, 1999
ISBN 3-7643-6151-4, 323+vii pages**

This volume contains the contributions of participants of the conference “Optimal Control of Partial Differential Equations“ held at the *Wasserschloss Klaffenbach* near Chemnitz from April 20 to 25, 1998. Scientists from 15 countries attended this conference, which was organised by the editors of this volume.

It has become apparent that theory of optimal control and optimal shapes as well as a concise numerical analysis in this area is extremely important for industrial applications. Moreover, complex processes in many cases imply a modelling based on partial differential equations, typically non-linear. Along with the dramatic increase in computer power, the application of PDE-based control theory and the corresponding numerical algorithms to industrial problems has become more and more important in recent years. This development is reflected by the fact that researchers focus their interest on challenging problems such as the study of controlled fluid-structure interactions, flexible structures, noise reduction, smart materials, the optimal design of shapes and material properties and specific industrial processes. The book consists of 27 refereed original papers which can be classified as follows: 9 paper in controllability, stabilizability and identifiability, 7 papers in optimal control, 6 papers in shape optimisation and 5 papers on general modelling and qualitative issues related to partial differential equations. About one half of the papers can be classified as theoretical work, while the other part is devoted to algorithmic procedures and numerical implementations.

This book offers a wide spectrum of aspects of the discipline and is of interest to scientist working in applied or theoretical mathematics and in the fields of applications. But for readers it is recommended to have a strong mathematical background on partial differential equations in order to take the full advantage of this competent state-of-the-art presentation.

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Einführung in die angewandte Statistik für Biowissenschaftler (in German)
Antonia B. Kesel / Monika M. Junge / Werner Nachtigall
Basel, Boston, Berlin: Birkhäuser, 1999
ISBN 3 7643 5953 6, 264 pages

This book gives a basic introduction to applied statistics. The text omits detailed theory but illustrates the presented methods with examples from biology.

After introducing prerequisites from probability theory chapters about descriptive and inductive statistics follow. The use of most standard distributions and statistical tests is worked out in detail, the centre of attention always lies on enabling the reader to use the presented material in applied science.

An extensive appendix contains detailed tables for all distributions and tests presented in the book, worked out solutions for all examples and translations for common English expressions used in statistics.

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Theorie und Praxis von Simulationssystemen; Eine Einführung für Ingenieure und Informatiker
Thomas Sauerbier
Braunschweig / Wiesbaden: Vieweg & Sohn, 1999
ISBN 3-528-03866-7, 225 pages, (in German)

Simulation is nowadays used in all fields of engineering, this book tries to give the basis for both doing and judging simulation. The author concentrates on discrete simulation and describes all steps from modelling via implementation and validation up to analysing achieved results. Throughout the text, which is strictly structured in 122 chapters and sub-chapters, theory is accompanied by real-world examples and implementations in C++ and MS Excel. Source codes of all examples can be downloaded from www.vieweg.de.

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Werkzeuge für die Modellierung und Simulation im Umweltbereich (in German)
Rolf Grützner, Michael Möhring (ed.)
Metropolis Verlag, 1999
ISBN 3-89518-243-5, 228 pages

The book is a collection of 17 contributions (all in German) about tools for modelling and simulation in

environmental engineering. The appropriate workshop was held in Koblenz in 1999. The first article by the editor gives a short overview about problems, terms and definitions. The contributions, divided in 4 chapters, are about tools and information systems, new methods, analysis of geographical spaces and biological processes.

N. Popper, TU Vienna

Vom Plastik zur Chipkarte (in German)
Yahya Haghiri, Thomas Tarantino
Carl Hansen Verlag München Wien, 1999
ISBN 3-446-21249-3, 275+ix pages

Not Quentin, but Thomas Tarantino and his colleague Haghiri, both specialists at Giesecke & Devrient, one of the leading producers of chip cards in Germany, describe everything you ever wanted to know about the cards – and maybe more. The different kinds of chip cards are explained in all details. Qualities, materials and the construction, as well as the operational areas of the chip card are shown. Additionally there are a glossary with all technical terms and abbreviations, a literature list and a list of the biggest manufacturers, as well as a summary of current chips increase.

N. Popper, TU Vienna

Wahrscheinlichkeitsrechnung
Calculus of Probability (in German)
D. Foata, A. Fuchs
Birkhäuser 1999
ISBN 3-7643-6169-7

This book gives an introduction for the undergraduate student into the field of Probability, dealing with all standard topics from Probability Spaces and their set-theoretic base to the Central Limit Theorem and applications. The main ideas of Measure and Integration Theory are presented where they are necessary for the development of a modern, axiomatic approach to Probability; so just knowledge of Analysis is necessary for understanding. Many problems with solutions and additional comments complete the book. A detailed review may be found in *ASIM-Nachrichten* 1/2000.

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News on Books and Journals



Simulation Practice and Theory

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

Forthcoming papers (status February 11, 2000)

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

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

J.P. Voroney, A.T. Lawniczak, Construction, mathematical description and coding of reactive lattice-gas cellular automaton.

G.A. Korn, Simplified function generators based on fuzzy-logic interpolation.

H. Madadi Kojabadi, G. Ahrabian, Simulation and analysis of the interior permanent magnet synchronous motor as a brushless AC-drive.

F. Soares Lameiras, Simulation of particle coarsening with iteration function systems.

M.H. News, A. Pohorille, An inherited efficiencies model of non-genomic evolution (BioMedSim special issue).

G.K. Theodoropoulos, Modelling and distributed simulation of asynchronous hardware.

Y.N. Al-Nassar, M. Siddiqui, A.Z. Al-Garni, Artificial neural networks in vibration control of rotor bearing systems.

J. Pusenjak, D. Miklavcic, Modeling of interstitial fluid pressure in solid tumor (BioMedSim special issue).

J.H.M. Frijns, J.J. Briaire, R. Schoonhoven, Integrated use of volume conduction and neural models to simulate the response to cochlear implant (BioMedSim special issue).

J.J. Briaire, J.H.M. Frijns, 3D mesh generation to solve the electrical volume conduction problem in the implanted inner ear (BioMedSim special issue).

M. Arita, Metabolic reconstruction using shortest paths (BioMedSim special issue).

J. Hlavicka, S. Racek, P. Herout, Evaluation of process controller fault tolerance using simulation.

M. Alexik, Modelling and identification of an eye-hand dynamics (BioMedSim special issue).

J. Czczot, M. Metzger, J.P. Barbary, M. Nihtilä, Filtering in adaptive control of distributed parameter bioreactors in the presence of noisy measurements (BioMedSim special issue).

WWW information:

<http://www.elsevier.nl/locate/simptra/>

Submissions of manuscripts should be sent to:

Prof. Dr. L. Dekker

Noordeindseweg 61

2651 LE Berkel en Rodenrijs, The Netherlands

Websites of Interest

Here we point out address of websites of interest to the simulation community. Please let us know if you come across an interesting site.

The **INFORMS-College on Simulation** is pleased to announce that full papers from the Proceedings of the Winter Simulation Conference for the years 1998 and 1999 are now freely available on the college website <http://www.informs-cs.org/>

The **Visual Simulation Resource**. Volunteer-managed site by a dozen vis-sim experts from various companies: <http://www.vis-sim.org/>

Micro-Simulation Tools on the WWW

<http://www.its.leeds.ac.uk/smarest/links.html>

MSSANZ, Modelling and Simulation Society of Australia and New Zealand Inc.

<http://cres.anu.edu.au/~tony/mssanz/>

The Modelling and Simulation Society of Australia and New Zealand Inc. (MSSANZ), is an affiliate of the International Association for Mathematics and Computers in Simulation (IMACS).

A collection of **Hotlinks** to societies, simulation tools, companies, and other simulation related topics can be found at: <http://www.argesim.org/hotlinks/>

Classes on Simulation

April 2000

- 3-5 **Simulation ACSL, ACSL GM, ACSL MATH.** Munich, Germany.
Contact: BAUSCH-GALL GmbH, Wohlfartstr. 21b, D-80939 München, Tel.: +49-89 3232625, Fax: +49-89 3231063, email: BauschGall@compuserve.com
- 4-6 **MATLAB/SIMULINK in der Automatisierungstechnik.** Aachen, Germany.
Contact: Scientific Computers, Franzstr. 107-109, D- 52064 Aachen, Tel.: +49-241- 47075-0, Fax: +49-241- 44983, email: info@scientific.de
- 6 **MATLAB interaktives Arbeiten.** Gümüngen, Switzerland.
Contact: Scientific Computers
- 6-7 **Kurs Dymola.** Munich, Germany.
Contact: BAUSCH-GALL GmbH
- 11-12 **Programmierung und Simulation von Steuerungen mit STATEFLOW.** Aachen, Germany.
Contact: Scientific Computers
- 13 **MATLAB Programmierung.** Gümüngen, Switzerland.
Contact: Scientific Computers
- 17-18 **Einführung in MATLAB.** München, Germany.
Contact: Scientific Computers
- 27 **SIMULINK.** Gümüngen, Switzerland
Contact: Scientific Computers

May 2000

- 8-9 **Kurs MATLAB.** Munich, Germany.
Contact: BAUSCH-GALL GmbH
- 8-9 **Einführung in SIMULINK.** München, Germany.
Contact: Scientific Computers
- 11-12 **Kurs MATLAB.** Munich, Germany.
Contact: BAUSCH-GALL GmbH
- 11 **MATLAB interaktives Arbeiten.** Gümüngen, Switzerland.
Contact: Scientific Computers
- 15-17 **CCG-Kurs. Modellbildung und Simulation dynamischer Systeme** (I. Bausch-Gall and F. Breiteneker). Oberpfaffenhofen, Germany.
Contact: F. Breiteneker, TU Wien, Tel: +43-1 58801 11452, Fax: +43-1 58801 42098, email: Felix.Breiteneker@tuwien.ac.at or Carl-Cranz-Gesellschaft e.V., Postfach 11 12, D-82230 Weßling, Fax: +49-8153 281345, email: ccg@dlr.de

- 15-16 **Kurs PSpice.** Munich, Germany.
Contact: BAUSCH-GALL GmbH
- 17 **Effektive Simulation von Schaltnetzwerken.** Munich, Germany.
Contact: BAUSCH-GALL GmbH
- 18 **Effektive Regelung von Schaltnetzteilen.** Munich, Germany.
Contact: BAUSCH-GALL GmbH
- 18 **MATLAB Programmierung.** Gümüngen, Switzerland.
Contact: Scientific Computers
- 22-24 **Kurs SIMULINK.** Munich, Germany.
Contact: BAUSCH-GALL GmbH
- 23-24 **Einführung in MATLAB.** Aachen, Germany.
Contact: Scientific Computers
- 25 **SIMULINK.** Gümüngen, Switzerland.
Contact: Scientific Computers
- 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
- Seminar: Anwendungen diskreter Simulation mit ARENA und TAYLOR-ED.** TU Vienna, Austria
Contact: ARGESIM
- Seminar: Simulation mit OPNET.** TU Vienna, Austria
Contact: ARGESIM

June 2000

- 5-9 **Mathematical Modeling and Digital Computer Simulation of Engineering and Scientific Systems.** Zurich, Switzerland.
Lecturers: W.J. Karplus (UCLA, USA); H.J. Halin (ETH Zurich, CH); J.U. Thoma (CH, formerly Univ. of Waterloo, CDN)
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/>
- 6-7 **Einführung in SIMULINK.** Aachen, Germany.
Contact: Scientific Computers
- 20-21 **Programmierung und Simulation von Steuerungen mit STATEFLOW.** Aachen, Germany.
Contact: Scientific Computers
- 26-28 **MATLAB/SIMULINK in der Automatisierungstechnik.** München, Germany.
Contact: Scientific Computers

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Calendar of Events

April 2000

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

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

May 2000

- 2-3 **Workshop: Agent Based Simulation**. Passau, Germany
Contact: WWW: <http://www.or.uni-passau.de/workshop2000/>
- 2-4 **MOSIS 2000**. 34th Int. Conference on Modelling and Simulation of Systems. Roznov pod Radhostem, Czech Republik
Contact: Jan Stefan, FEI -VSB TU, Ostrava, tr. 17. Listopadu 15, CZ-70833 Ostrava Poruba, email: jan.stefan@vsb.cz, WWW: <http://www.fee.vutbr.cz/UIVT/ism/>
- 8-10 **EUROMEDIA 2000**. . Antwerp, Belgium
Contact: Philippe Geril, SCS Europe, c/o University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: Philippe.Geril@rug.ac.be, WWW: <http://hobbes.rug.ac.be/~scs/conf/euromed2000/>
- 10-12 **HPCN Europe 2000**. The 8th International Conference on High Performance Computing and Networking Europe. Amsterdam, The Netherlands
Contact: email: hpcn2ksubmit@wins.uva.nl, WWW: <http://www.wins.uva.nl/events/HPCN2k/>
- 11-12 **Computational Intelligence und industrielle Anwendungen. VDI/ VDE-Gesellschaft/GMA und GI**. Baden-Baden, Germany
Contact: Mrs. A. Schillings, VDI/VDE-Gesellschaft Mess- und Automatisierungstechnik, Postfach 10 11 39, D-40002 Düsseldorf, email: schillings@vdi.de
- 23-26 **ESM 2000**. 14th European Simulation Multiconference. Ghent, Belgium
Contact: Philippe Geril, SCS European Simulation Office, University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: Philippe.Geril@rug.ac.be, WWW: <http://hobbes.rug.ac.be/~scs/>
- 28-31 **PADS 2000**. 14th Workshop on Parallel and Distributed Simulation. Bologna, Italy
Contact: David Bruce, Defence Evaluation and Research Agency, St. Andrews Road, UK-Malvern WR14 3PS, Tel.: +44-1684 895112, Fax: +44-1684 894389, email: dib@dera.gov.uk, WWW: www.dcs.exeter.ac.uk/~pads2000/

- 30-31 **ZEL '2000**. Railways on the edge of the third millennium. Zilina, Slovak Republic
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

June 2000

- 13-16 **ITI 2000**. 22nd Int. Conference Information Technology Interfaces. Pula, Croatia
Contact: Conference Secretariat ITI 2000, University Computing Centre, Josipa Marohnica bb, HR-10000 Zagreb, Croatia, Tel.: +385-1-616 55 97, Fax: +385-1-616 55 91, email: iti@srce.hr, WWW: <http://www.srce.hr/iti/>
- 26-27 **FOODSIM 2000**. International Conference on Simulation in Food and Bio Industries. Nantes, France
Contact: Philippe Geril, SCS Europe, c/o University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: Philippe.Geril@rug.ac.be, WWW: <http://hobbes.rug.ac.be/~scs/conf/FOODSIM2000/>

July 2000

- 3-7 **IPMU2000**. The 8th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems. Madrid, Spain
Contact: email: ipmu@mat.upm.es, WWW: <http://www.mat.upm.es>
- 16-20 **Summer Computer Simulation Conference**, Vancouver, BC
Contact: <http://www.scs.org/confernc/scsc00/scsc2000cfp.html>

August 2000

- 21-25 **IMACS Congress 2000**. 16th IMACS World Congress. Lausanne, Switzerland
Contact: Prof. Robert Owens, IMACS Congress 2000, DGM - IMHEF - LMF, Swiss Federal Institute of Technology, CH-1015 Lausanne, , Fax: +41-21-693-3646, email: robert.owens@epfl.ch, WWW: <http://IMACS2000.epfl.ch/>
- 28-30 **MESM '2000**. 2nd Middle East Symposium on Simulation and Modeling. Amman, Jordan
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>
- 29-September 1
Euro-Par 2000. Munich, Germany
Contact: email: europar2k@in.tum.de, WWW: <http://www.in.tum.de/europar2k/>
- 30-31 **ASIS '2000**. Advanced Simulation of Systems. Sv Hostyn, Czech Republic
Contact: Jan Stefan, FEI -VSB TU, Ostrava, tr. 17. listopadu, CZ-70833 Ostrava Poruba, email: Jan.Stefan@vsb.cz

September 2000

- 8-9 **Simulation, Gaming, Training and Business Process Reengineering in Operations.** Riga, Latvia
Contact: Prof. Dr. Yuri Merkurjev, Dept. of Modelling and Simulation, Riga Technical University, 1 Kalku Street, LV-1658 Riga, Tel.: +371-7089514, Fax: +371-7089513, email: merkur@itl.rtu.lv, WWW: <http://www.itl.rtu.lv/RigaConf2000/>
- 10-13 **DAPSYS 2000.** Austrian- Hungarian Workshop on Distributed and Parallel systems. Lake Balaton, Hungary
Contact: WWW: <http://www.lpds.sztaki.hu/DAPSYS2000/>
- 12-14 **ASIS 2000.** 22nd Intl. Workshop Advanced Simulation Systems. Czech republic
Contact: Jan Stefan, FEI - VSB TU, Ostrava, tr. 17. Listopadu, CZ-70833 Ostrava Poruba, email: Jan.Stefan@vsb.cz
- 14-16 **7th PSCS Workshop on Simulation in Research and Development.** Zakopane, Poland
Contact: email: gogolek@ias.wat.waw.pl
- 25-28 **ASIM 2000. 14. Symposium Simulationstechnik.** Hamburg, Germany
Contact: Elke Gabriel, Universität Hamburg, Vogt-Kölln-Strasse 30, D-22527 Hamburg, Tel.: +49-40-42883 2438, Fax: +49-40-42883 2552, email: asim2000@informatik.uni-hamburg.de, WWW: <http://www.informatik.uni-hamburg.de/TIS/ASIM2000.html>
- 28-30 **ESS '2000.** European Simulation Symposium. Hamburg, Germany
Contact: Philippe Geril, SCS Europe, c/o University of Ghent, Coupure Links 653, B-9000 Ghent, Tel.: +32-9 233 77 90, Fax: +32-9 223 49 41, email: Philippe.Geril@rug.ac.be, WWW: <http://hobbes.rug.ac.be/~scs/>
- 28-30 **Electronic Computers and Informatics ' 2000.** Herlany, Slovak Republic
Contact: Dr. Ing. J. Baca, email: bacaj@tuke.sk

October 2000

- 24-26 **JSST International Conference on Modeling, Control and Computation in Simulation.** Tokyo, Japan
Contact: JSST 2000 Secretariat, Kagawa lab., Tokyo Institute of Technology, 4259 Nagatsuta-cho, Midori-ku, Yokohama 226-8503, WWW: <http://wwwsoc.nacsis.ac.jp/jsst/kokusaikaigi/jsst2000.html>

December 2000

- 10-13 **WSC '00.** Winter Simulation Conference. Orlando, Florida
Contact: WWW: <http://www.wintersim.org/>

June 2001

- 26-29 **EUROSIM 2001.** 4th International EUROSIM Congress. Delft, The Netherlands
Contact: Mrs. T. Tijanova, Delft University of Technology, Faculty of Information Technology and Systems, P.O. Box 5031, NL-2600 GA Delft, Fax: +31-15-2787209, email: eurosim2001@pa.twi.tudelft.nl, WWW: <http://ta.twi.tudelft.nl/PA/Eurosims2001/>

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Aims and Scope

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

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

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

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

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

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