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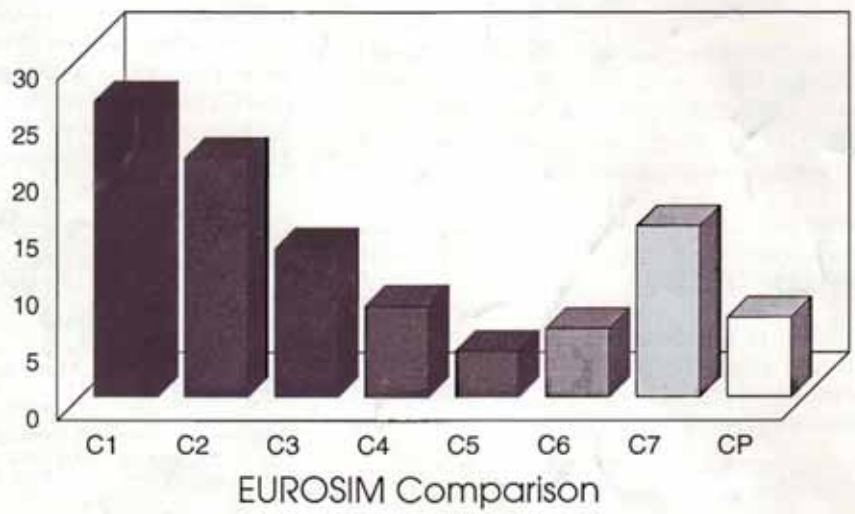

EUROSIM Comparison

Number 14

July 1995

A EUROPEAN FORUM ON SIMULATION ACTIVITIES

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Readership Information

EUROSIM - Simulation News Europe is published on behalf of EUROSIM (the Federation of European Simulation Societies) three times a year by the „ARGE Simulation News", a non-profit working group. Circulation is 2100. EUROSIM - Simulation News Europe is distributed by all member societies to their individual members (as part of the membership services). It is also included in the scientific journal „Simulation Practice and Theory", published by Elsevier Science B.V.

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If you have any contributions, remarks, suggestions, etc. please contact the editors. Deadline for the next issue will be October 2,1995.

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EUROSIM - Simulation News Europe

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

Editors: F. Breitenecker, I. Husinsky
ARGE Simulation News

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Editorial

In 1990 the idea of the EUROSIM software comparisons was born. Now, five years later, eight different comparisons have been defined and altogether 100 solutions with different tools have been published in EUROSIM - Simulation News Europe. The graphic on the title page shows the number of published solutions for each of the comparisons. The software comparisons have become a very essential part of this journal. We thank all our readers for their interest and for their cooperation and we will continue with this program.

Visit us at our WWW sever at <URL:http://eurosim.tuwien.ac.at/>. As usual we would like to thank all who have contributed to this issue. We hope to see you at the **EUROSIM 95 Congress** in Vienna in September.

F. Breitenecker, I. Husinsky

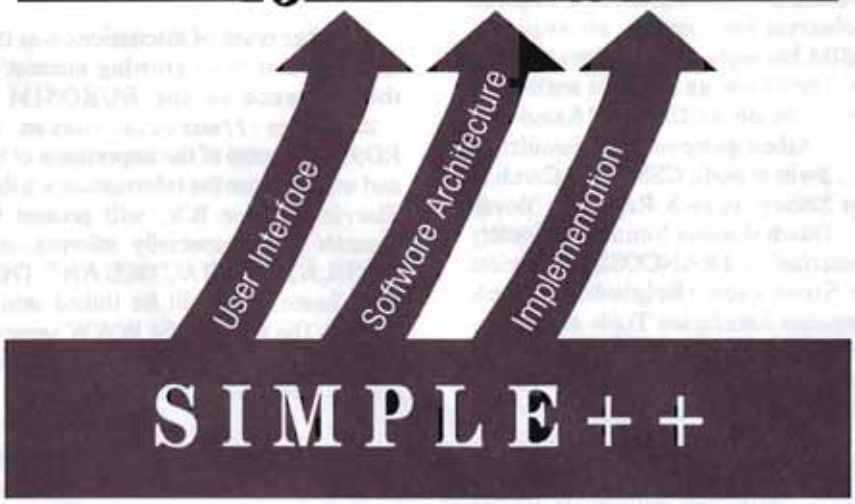
Aims and Scope

The journal EUROSIM - Simulation News Europe publishes information related to simulation. It is distributed to all members of all European member societies. It contains essays on simulation, reports from EUROSIM and from the European simulation societies, reports from international societies, presentations of simulation centres, industry news, book reviews, a calendar of events. A special series on simulation comparisons gives an overview on features of simulation software and hardware. All contributions are selected and may be edited by the editors of the newsletter.

Editorial Board of the European Simulation Societies:

The new Class of Simulation Software

»Full Object Orientation«



Features of SIMPLE++

- **full object orientation**
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- **innovative building block concept**
- **user definable building blocks and individual libraries**
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- **incremental modeling from the rough function stepwise to the finest detail**
- **powerful built-in languoge and debugging facilities**
- **flexible information management**
- **easy-to-use graphical user interface, all information is represented graphically**
- **interfaces: ASCII, SQL, C, C++, Program to Program Communication**

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SIMPLE++ was developed by AESOP together with the Fraunhofer Institute for Production and Automation (IPA) and is based on over 10 years of experience in applying and developing simulation software.

SIMPLE++ defines a new class of simulation software because of its modeling efficiency, user friendliness and range of application. Most of the users benefit stems from the full object orientation.

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- **Sales/Marketing**
- **Simulation Services**

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Peter Gangl
Phone (+49-711) 16 35 90
Fax (+49-711) 1 63 59 99
AESOP GmbH, KönigstraBe 82
D-70173 Stuttgart
Germany

AESOP

EUROSIM News

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. Two kinds of membership, full membership and observer membership, are available. At present EUROSIM has eight full members and two observer members. The following societies are the full members, an asterisk indicates a EUROSIM foundation members: ASIM* - Arbeitsgemeinschaft Simulation (Austria, Germany, Switzerland), CSSS - the Czech & Slovak Simulation Society (Czech Republic, Slovak Republic), DBSS* - Dutch Benelux Simulation Society (Belgium, The Netherlands), FRANCOSIM* - Société Francophone de Simulation (Belgium, France), HSTAG - the Hungarian Simulation Tools and Application Group (Hungary), ISCS* - Italian Society for Computer Simulation (Italy), SIMS* - Simulation Society of Scandinavia (Denmark, Finland, Norway, Sweden), UKSS* - United Kingdom Simulation Society (UK). AES - Asociación Española de Simulación (Spain) and SLOSIM - Slovenian Simulation Society (Slovenia) are observer members.

The two observer members AES and very recently SLOSIM joined EUROSIM in the last year. They get help to set up and develop their societies.

EUROSIM is governed by a **Board** consisting of one representative of each member society. The Board elects officers, who are at present: F. Breitenecker (ASIM) - president, F. Maceri (ISCS) - past president, R. Zobel (UKSS) - secretary, L. Dekker (DBSS) - treasurer.

EUROSIM's journal EUROSIM Simulation News Europe (**SNE**) publishes information on simulation news in Europe and trends in simulation, including reports of EUROSIM's member societies. **Simulation Practice and Theory** (SIMPRA), EUROSIM's scientific journal, publishes high quality contributions on modelling and simulation.

At the last Board meeting (North Berwick, Scotland, April 1995) SLOSIM, the Slovenian Simulation Society, was welcomed as observer member. A decision about an observer membership of CROSSIM was postponed. Furthermore, letters of intent for an observer membership from the Latvian and the Romanian simulation society were discussed. It was decided to invite representatives of these societies to represent their society at the EUROSIM 95 Congress in Vienna and to give more information to the board. The same procedure was suggested for simulation societies and simulation groups from countries of the former Soviet Union.

Another point of discussions was the importance of the more and more growing internet information and the contence of the EUROSIM WWW server (<URL:http://eurosim.tuwien.ac.at/>. EUROSIM is aware of the importance of this new medium and will increase the information via this medium. Also Elsevier Science B.V. will present their books and journals there, especially information on the journal SIMULATION PRACTICE AND THEORY (the journal's home page will be linked into the EUROSIM server). The EUROSIM WWW server becomes popular, as many requests have shown and many other servers offer links to it.

Mr. Breitenecker offered all member societies the possibility to provide information about their society on the EUROSIM server. This can be done either with links to existing servers or with specially prepared home pages (see for instance ASIM):

The next meeting of the EUROSIM board will take place during the EUROSIM 95 Congress in Vienna.

The EUROSIM '95 Congress will take place at
Technical University in Vienna, Austria
from September 11 - 15, 1995

The EUROSIM Simulation Congress is concerned with all aspects of computer simulation methodology and application.

Report on preparations:

The response to the First and the Second Call for Papers was overwhelming for us. The Scientific Committee finished the reviewing of the abstracts before Easter. This is the result of the reviewing process: from 459 abstracts submitted 172 have been accepted as papers, 101 have been conditionally accepted as papers, 111 have been suggested as posters, 34 have been suggested for a special session on "Software Tools and Products".

Proceedings:

Authors have been notified in April and authors of accepted papers have been asked to prepare a camera-ready paper for the Proceedings. The Proceedings are being printed now by Elsevier Science B.V. and will be available at the Congress. The Proceedings contain 240 papers. There will be a Late Paper Volume for publication of papers that arrived too late to be included in the Proceedings.

The papers in the Proceedings are divided into the following sections which will correspond to Congress sessions:

Invited Lectures
Special Lectures
Simulation Methodology
Mathematical and Statistical Methods
Genetic Algorithms in Simulation
Parallel Simulation
Distributed Simulation
Distributed Interactive Simulation
Mathematical Modelling and Applications
Model Exchange and Software Independent Modeling ("Industry Session")
Simulation of Computer Systems
Simulation of Communication Systems
Real-Time Simulation and Hardware-in-the-Loop Simulation
Simulation in Mechatronics and Computational Mechanics
Simulation in Robotics
Simulation in Electrotechnique and Electronics
Simulation of Power Systems
Simulation in Thermodynamic Processes
Simulation in Physics and Chemistry
Simulation in Process Engineering
Simulation of Environmental Systems
Simulation in Biology and Medicine
Simulation of Logistic and Manufacturing Sytems
Simulation in Economics and Administration
Fuzzy Systems in Simulation
Neural Nets in Modelling and Simulation
Petri Nets in Modelling and Simulation
Simulation and Artificial Intelligence
Knowledge-Based Simulation
Modelling and Simulation in Education and Training

Invited Speakers:

B. Buchberger (A): Symbolic Computation Software Systems - The Current State of Technology
E.R. Carson (GB): Metabolic Modelling: Past, Present and Future
M. Gervautz (A): Animation and Visualisation - Current Status and Trends
D.P.F. Möller (D): Fuzzy Systems in Modelling and Simulation
D. Murray-Smith (GB): Advances in Simulation Model Validation: Theory, Software and Applications
T. Schriber (USA): How Discrete-Event Simulation Software Works
P. Sloot (NL): Modelling for Parallel Simulation: Possibilities and Pitfalls
O. Steinhauser (A): Biomolecular Simulation

Session "Software Tools and Products":

A Special Session will be dedicated to "Software Tools and Products". In this session new developments in simulation tools will be presented. The range will spawn from commercial tools to freeware, etc. The papers will be published in a set of preprints specific to this session, available at the Congress.

Poster Session:

One part of the Scientific Programme will be a special Poster Session on Thursday afternoon, September 14. Participants are invited to inform themselves on the posters in walking around in the poster/exhibition area, where the authors will give explanations. Refreshments will be served. Posters may be on display from Monday to Friday.

The visitors of the poster session may select the best posters. The three winners will receive a one-year subscription to the journal "Simulation Practice and Theory". Also one winner will be drawn from the visitors who take part in the selection of the best poster.

Abstracts of the posters will be published in the Poster Book, which will be distributed to all Congress participants.

User Groups and Tutorials:

On Monday User Group Meetings and Tutorials will be held.

User Group Meetings for ACSL, MATLAB/ SIMULINK, GPSS/H, and SPICE are scheduled.

Tutorials:

T1: HDL-A, VHDL-based analog and mixed signal modeling description language
T2: Opto Electronic Processing & Networking
T3: Communications Network Planning Through Object Oriented Simulation
T4: Object-Oriented Simulation of Discrete Systems with Applications
T5: Simulation and Animation
T6: Tips and Tricks in MATLAB/SIMULINK
T7: Fuzzy Object-Oriented System Modelling and Simulation

Social Events:

The scientific and the social events should create an atmosphere where simulationists (experts as well as newcomers) can exchange their problems, ideas and solutons, and make friends within the simulation society.

Monday evening starts with a Welcome Party. The highlights of the social programme are a typical *Heurigen Evening* (not of touristic style!) on Tuesday, an organ concert (Wednesday, late afternoon), and a Reception by the Mayor and a **Congress Dinner** in the Townhall. The congress ends with a closing session and a closing party on Friday afternoon.

Exhibitors and Sponsors:

Exhibitors and main sponsors:

Rapid Data Ltd., Worthing, West Sussex, UK
Scientific Computers, Aachen, Germany
UNSELD & PARTNER / AESOP GmbH, Wien / Stuttgart, Germany / Austria

Exhibitors:

ARS Integrated Systems, Germany
BAUSCH-GALL GmbH, Munich, Germany
dSpace Gmbh, Paderborn, Germany
DUAL Zentrum, Dresden, Germany
CACI, Camberley, Surrey, UK
ExperTeam SimTec GmbH, Dortmund, Germany
SIMEC GmbH, Chemnitz, BRD
SIMUTECH, Wien, Austria
Solutions Foundry Ltd., Kettering, UK
Systems Modeling Corp.

Sponsors:

Elsevier Science B.V., Amsterdam, NL
Taylor&Francis, U.K.
Uni Software Plus, Austria

Publishers will present books on simulation and related areas. Inquiries about the exhibition facilities are welcome.

Registration Fee:

The congress fee includes access to the scientific programme and a copy of the proceedings. It also includes the social events and a ticket for public transportation in Vienna during the congress, and some extras. A ticket for accompanying persons is available. It includes all social events, the transportation ticket, and a guided walk in the city of Vienna.

Registration fee,	
members of EUROSIM member societies and	
sponsoring societies	ATS 4.200.-
for other participants	ATS 4.700.-
Students (attendance only)	ATS 500.-
Accompanying Persons	ATS 1.300.-

Venue, Accommodation:

The congress will take place in the building "*Freihausgründe*", one of the main buildings of TU Vienna, located in the center of Vienna.

Austropa Interconvention has been entrusted to handle the reservation of hotel rooms and offers an accompanying person's programme and post congress tours.

Preliminary Programme:

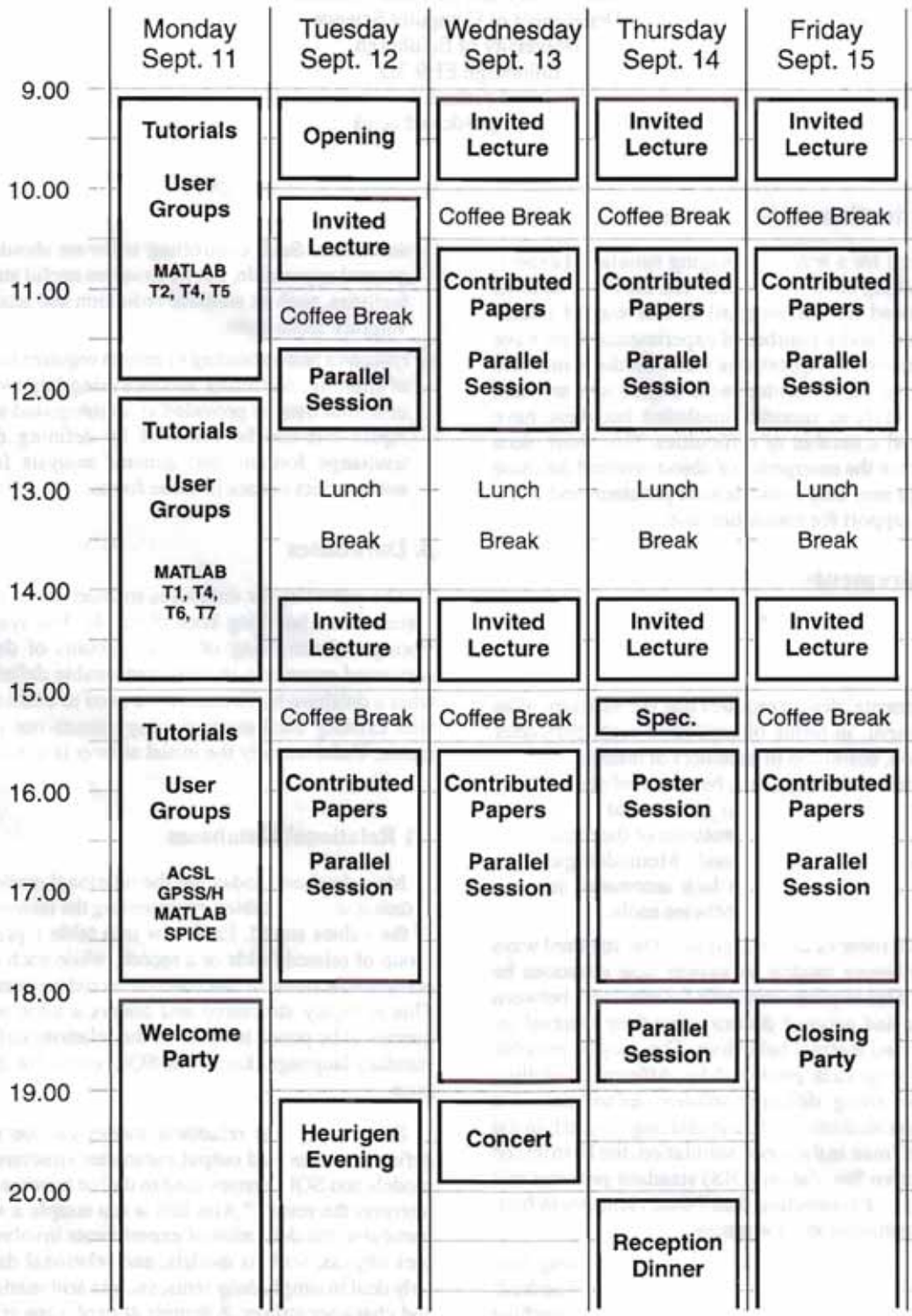
A preliminary schedule is given on the next page. A preliminary programme will be available in July. It will be sent to all registered participants and can be requested from the address given below.

Congress Address:

EUROSIM '95
Computing Services / E020
Technical University of Vienna
Wiedner Hauptstr. 8-10
A - 1040 Vienna, Austria
Tel.: +43-1-58801-5386 or -5374 or -5484,
+43-664-3001725
Fax: +43-1-5874211
E-mail: eurosim95@email.tuwien.ac.at
On-line information
<URL: http://eurosim.tuwien.ac.at/>

F. Breitenecker, I. Husinsky
Organization Committee

EUROSIM 95 Preliminary Schedule



Object Oriented Simulation and Object Oriented Databases

Dr Rob Pooley and Dr Peter Thanisch
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1. Introduction

The need for a way of managing simulation experiments has long been recognised. The DEVS formalism was proposed by Zeigler [5,6] as one way of understanding this and a number of experimental tools have been produced to support this view. At the same time people have experimented with expert systems and databases [1,7] to support simulation but these have encountered a number of difficulties. This short piece suggests how the emergence of object oriented database technology may help to tackle such problems and allow effective support for simulation use.

2. Requirements

The need for some form of support arises from several causes. These include:

1. Experimental design requires that the structure of an experiment, in terms of replicated runs, parameter variation, definition of measures of interest and strategies for achieving goals, be specified clearly. This is best done in the context of a formal framework, where the statistical interpretation of the experiment can be properly understood. Methodologies like DEVS formalise this, but lack automated support, which could come from software tools.
2. Efficient reuse of models requires that standard ways of combining models to answer new questions be found. This requires standards for interfaces between models and ways of documenting their external interface and internal behaviour. This may be possible even for models produced by different modelling tools or using different solution techniques, if a common medium for data interchange is used. In the field of "man in the loop" simulation, the Distributed Interactive Simulation (DIS) standard provides this as a way of connecting distributed elements in battlefield simulations, for instance.
3. Efficient execution of experiments, involving running and collecting results from possibly hundreds of model/parameter combinations, requires machine assistance. Such controlling software should be as general as possible, but be based on useful statistical facilities, such as variance reduction and analysis of variance techniques.
4. Effective understanding of results requires that ways of filtering, collecting and analysing large volumes of output data be provided in an integrated manner. Again this can be achieved by defining data interchange formats and general analysis facilities with respect to data in these forms.

3. Databases

The potential for databases to meet some of these requirements has long been clear [4]. The systematic storing and retrieving of large amounts of data in a structured manner is in fact a reasonable definition of what a database is. Therefore we need to consider how well existing database technology meets our requirements. Unfortunately the initial answer is not encouraging.

3.1 Relational Databases

Most databases today use the relational model, where data is stored in tables, representing the interpretation of the values stored. Each row in a table represents a group of related fields or a record, while each column defines how fields in that column should be interpreted. This is highly structured and allows a wide range of queries to be posed in terms of the relations defined. A standard language, known as SQL, exists for this purpose.

Surely then the relational model can be used to define the input and output parameter structure of our models and SQL queries used to define how we wish to interpret the results? Alas this is too simple a view. In particular, the definition of experiments involves complex objects, such as models, and relational databases only deal in simple data items, such as arithmetic values and character strings. Attempts at exploiting relational

databases have had to resort to storing file names and accessing their contents indirectly. This is highly unsafe and cumbersome.

3.2 Object Oriented Databases

The restrictions on relational databases are not unique to their use in simulation support and there has been a great deal of interest in how to overcome them. This has resulted in the emergence of object oriented databases, where the structure of data is represented by classes in an object oriented language, such as C++. Relationships and properties can be programmed in the host language in a very flexible way.

The database manager in such a system provides secure persistent storage of objects from running programs, so that the information is not lost once programs end. This is usually done in terms of a client/server architecture and so programs may exchange objects as well as storing and retrieving their own, by making appropriate calls to the object manager.

The management system provides security, concurrency control, versioning etc. The functionality of the system is programmed in the host language, rather than in SQL. This requires more programming effort, but allows greater flexibility.

4. Simulation Support in OO DBMS

The proposal of this paper is that effective support for simulation experiments may be provided by exploiting the power of a good object oriented database management system. To demonstrate this work has been going on at Edinburgh on building such facilities into the HASE modelling environment. So far we have shown that the potential is real, with simple facilities for storing and analysing results from multiple runs under systematically varying parameter values. Variance reduction, by automatic replications under fixed parameter values, is also supported in this way.

The use of concurrency features in the database manager (in our case ObjectStore from Object Design Inc.) is currently being investigated. This will allow replicated independent runs to be performed in parallel under control of the database manager [2]. Where a network of workstations or PCs exists this will offer linear speedup up to the number of independent runs required at little cost.

5. Further Issues

Work in this area at Edinburgh will soon be moving to look at two further ideas. The first is the use of database concurrency features, such as rollback, to implement parallel simulation within a single model run, possibly via the TimeWarp mechanism. This is very speculative, but might be useful for very large discrete event simulations [3].

More open ended and, potentially more interesting still, is the integration of object oriented description techniques with model and experiment formulation. Many people are using object oriented simulation languages or graphical object based modelling tools. These do not usually exploit the object structure to make modelling systematic or experiments more intuitive. We believe that there exists enormous potential for this, and thereby encouraging the convergence of modelling and software engineering.

References

[1]P. Beynon-Davies and A. R. Hutchings, Modelling and Databases, European Journal of Operational research, 64, pp 327-337 (1993)

[2]P. Heywood, R.J. Pooley and P.T. Thanisch, Object oriented Database Technology Applied for Simulation Environments, UKSS '95 Conference Vol. II, North Berwick, April 1995

[3]P. Heywood, G. MacKechnie, R.J. Pooley and P.T. Thanisch, Object-Oriented Database Technology Applied to Distributed Simulation, Eurosim Congress '95, Vienna, September 1995

[4]R.J Pooley, The Integrated Modelling Support Environment, Computer Performance Evaluation, Elsevier, 1991

[5]B.P. Zeigler 1976 Theory of Modeling and Simulation, Wiley, New York

[6]B.P. Zeigler 1984 Multi-facetted Modeling and Discrete Event Simulation, Academic Press, New York

[7]R.N. Zobel Classification of Simulation Models in Multi-disciplinary Object Bases, UKSS '93 Conference, pp39-43

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.

Report from ASIM

Book Series: At the last meeting of the ASIM board, Prof. Gerald Kampe of FHT Esslingen was elected as additional editor for the ASIM book series "*Fortschritte in der Simulationstechnik*" which is published at Vieweg Verlag. The book series has now two editors, Prof. Kampe and the ASIM speaker Prof. Möller. Nine books have been published until now, four are in preparation. A list of books is available from all members of the ASIM board.

The series has been divided into *Reihe A* for books (monographies) and *Reihe B* for excellent PhD-Theses or similiar publications. This new structure helps to publish a PhD-Thesis, classroom manuscripts, and other material, which may be interesting for more readers, fast and at a lower price. It is also discussed to publish the *ASIM-Mitteilungen* within this series.

ASIM looks for additional authors for this series. If you want to publish book on a simulation issue, please contact: Prof. G. Kampe (FHT Esslingen, Flandernstraße 101, D-73732 Esslingen, Tel: +49-711-397 3743, Fax: -3763) or any other member of the ASIM board.

***ASIM-Mitteilungen*:** With this issue of *EUROSIM - Simulation News Europe* we mail to all ASIM members a separate list of *ASIM-Mitteilungen*, which are on stock. On the back of this list you find an order form. Please contact Dr. Bausch-Gall if you did not receive this list.

New *ASIM-Mitteilungen* available are:

Nr. 41: *Simulation von Verkehrssystemen* (new issue) DM 35,00
Nr. 43: *Treffen des Arbeitskreises "Simulationssoft- und -Hardware"* 24.3.-25.3.1994 in Clausthal, DM 20,00
Nr. 44: *Treffen des Arbeitskreises "Simulation und Künstliche Intelligenz" und Workshop "Validierung"* 13.4.-15.4.1994 in Braunschweig DM 20,00
Nr. 47: Report on the meeting of the working group *"Simulation Technischer Systeme"* at DASA in Hamburg, 1995 DM 30,00

Industry Sessions at ASIM conferences: The first industry session will be organized by ASIM at the EUROSIM 95 Congress in Vienna in September 1995 on the subject "Model Exchange and Software Independent Modeling".

The session will be on Wednesday, September 13. About 12 speakers will report on necessity, state-of-the-art and standards (VHDL-A, GMA standard). At the end of the session a round-table-discussion will collect the results. We look forward to see many participants at this session and at the closing discussion.

Contact Addresses

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ASIM Meetings to come

September 11-15, 1995: EUROSIM Congress at TU in Vienna.

October 23-24, 1995: Meeting of the working group *"Simulationsmethoden und -sprachen für verteilte Systeme und parallele Prozesse"* in Dresden. Contact: Dr. Schwarz, FhG-IIS/EAS (address see below).

December 1, 1995: Meeting of the working group *"Simulation von Verkehrssystemen"* at the Fraunhofer Institute in Dortmund.

April 18-20, 1996: *7. Ebernburger Gespräche*. Contact: Prof. Richter (address see below)

September 16-19, 1996: ASIM 96, ***10. Symposium Simulationstechnik*** in Dresden. Contact: Michael Schebesta, DUAL-ZENTRUM Dresden, Gillesstraße 2, D-01219 Dresden

March 1997: 6. Symposium "*Simulation als betriebliche Entscheidungshilfe*", Braunlage. Contact: Prof. Hummeltenberg (address see below)

Meetings with ASIM Participation to come

September 21-22, 1995: ***Simulation und Simulatoren für den Schienenverkehr***, München. Conference Languages are German and English, conference invitation is only in German.

Veranstalter: *VDE-Gesellschaft für Fahrzeug- und Verkehrstechnik, Postfach 10 11 39, D-40002 Düsseldorf, Tel: +49-211 6214 264 or 523, Fax: +49-211 6214 163*

Working Groups

"Simulationsmethoden und -sprachen für verteilte Systeme und parallele Prozesse"

The 1995 workshop of the working group will be held at the Fraunhofer Institute IIS/EAS in Dresden on October 23 and 24, 1995. The main topics will be: Description methods for parallel and distributed systems, Parallel and distributed simulation (transputers, workstation clusters), Partitioning of large problems for parallelization, Analytical methods, Performance analysis, monotoring. For program details, please contact:

Speaker: Dr.-Ing. Peter Schwarz, Fraunhofer-Institut IIS/EAS, Zeunerstraße 38, D-01069 Dresden, Tel: +49-351 4640 730, Fax: +49-351 4640 703, Email:schwarz@eas.iis.fhg.de
Vice-speaker: Dr. Hans Fuss, GMD, D-53731 St. Augustin, Tel: +49-2241 143 125, Fax: +49-2241 143 006

"Simulationssoftware und -hardware"

The working groups annual spring meeting was held at *IBM Deutschland Speichersysteme GmbH* at Mainz. A report is under preparation as *ASIM-Mitteilung*. For 1996 the working group plans a meeting together with the working group "*Simulation Technischer Systeme*". For further information please contact the speakers of the working groups.

Speaker: Prof. Dr.-Ing. Dietmar P.F. Möller, TU Clausthal, Institut für Informatik, Erzstraße 1, D-38678 Clausthal-Zellerfeld, Tel: +49-5323 72 2402 or 72 2504 Fax: +49-5323 72 3572
Vice-speaker: Prof. Dr. Felix Breitenecker, TU Wien, Abt. Simulationstechnik, Wiedner Hauptstraße 8-10, A-1040 Wien, Tel: +43-1 58801 5374, Fax: +43-1 587 4211, Email: fbreiten@email.tuwien.ac.at

"Simulation und künstliche Intelligenz"

The annual workshop of the ASIM working group "*Simulation und Künstliche Intelligenz*" was held at *Technische Hochschule Darmstadt*, April 5-6, 1995.

The workshop brought together more than 30 participants from university and industry. This year, the main topic focused on the application of Virtual Reality in the area of Simulation and AI. The workshop started with an invited speech presenting the state of the art in Virtual Reality and its various application opportunities. Eight more papers had been subdivided into four sessions (Virtual Reality and Artificial Intelligence, VR-Applications, Agents in VR, Simulation Architectures). The workshop proceedings will be published in *ASIM Mitteilungen, Heft 49*.

Some of the discussed aspects were: State-of-the-Art Virtual Reality; Integration of AI methods in Virtual Reality applications; Verbal instruction as alternative input in virtual environments; Limits and expectations on VR development; Trustworthiness of VR supported simulations.

Speaker: Prof. Dr.-Ing. Helena Szczerbicka, Universität Bremen, 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.

"Simulation in Medizin, Biologie und Ökologie"

The next next conference of the working group, the 7th Ebernburg Working Conference, titled "Advances in Simulation in Medicine, Biology and Ecology" will be held from 18.4.-20.4.1996, at the castle Ebernburg at *Bad Münster am Stein-Ebernburg*. The main conference topics will be modelling and simulation practice and theory in biomecical/ecological research and the application of soft computing, e.g. fuzzy sets, neural nets, genetic algorithms, evolution strategy. For further information please contact:

Speaker: Prof. Dr. Otto Richter, TU Braunschweig, Institut für Geographie und Geoökologie, Langer Kamp 19c, 38106 Braunschweig, Tel: +49-531 391 5627 Fax: +49-531 391 8170
Vice-speaker: Prof. Dr. Björn Gottwald, Universität Freiburg, Fakultät für Biologie, Schänzlestraße 1, D-79104 Freiburg, Tel: +49-761 203 2891 Fax: +49-761 203 2894

"Simulation technischer Systeme"

This year the annual workshop of the ASIM Working Group "Simulation of Technical Systems" was hosted by Daimler-Benz Aerospace Airbus GmbH (DASA) at Hamburg on February 20 and 21, with local organization by Dipl.-Ing.G. Beuck.

About 110 participants from Industry, Research Centers and Academic Institutions met for a series of 5 sessions: Invited Papers, Reports from DASA, Reports from DLR (German Aviation and Space Association), Simulation of Electrical and Mechanical Systems, Simulation Tools.

In an ACSL User Group Meeting case studies as well as an outlook on the further development of this simulation tool were presented and discussed.

The first day sessions showed the leading role of simulation in aircraft design and test. Here hardware-in-the-loop simulation is of growing importance. On the second day results of electric, electronic and mechanical applications were discussed as well as experience with various simulation programs. The two invited papers focussed on the State-of-the-Art in Simulation and on the Automotive Mechatronic Design Stan- dardization Initiative.

A tour through the final assembly plant of Airbus 321 as well as a "test flight" in the fly-by-wire test stand showed that the high fail-safe standards in avionics afford enormous design efforts.

On Monday evening the traditional workshop dinner brought together experienced simulationists and newcomers for fruitful discussions in a friendly hanseatic atmosphere.

The Proceedings of the workshop will be available as *ASIM-Mitteilungen Nr.47* from I. Bausch-Gall.

On Monday evening working group members met to elect speaker and vice-speaker. Prof. Kampe did not candidate any more, Mr. Ewald Hessel was a candidate only for vice-speaker. So the only candidate Ingrid Bausch-Gall was elected as speaker, Ewald Hessel was reelected as vice-speaker.

Ingrid Bausch-Gall thanked Prof. Kampe for his efforts for this working group during the last 9 years.

Other subjects discussed at this meeting were: reorganization of the working group, special issues and the next meeting.

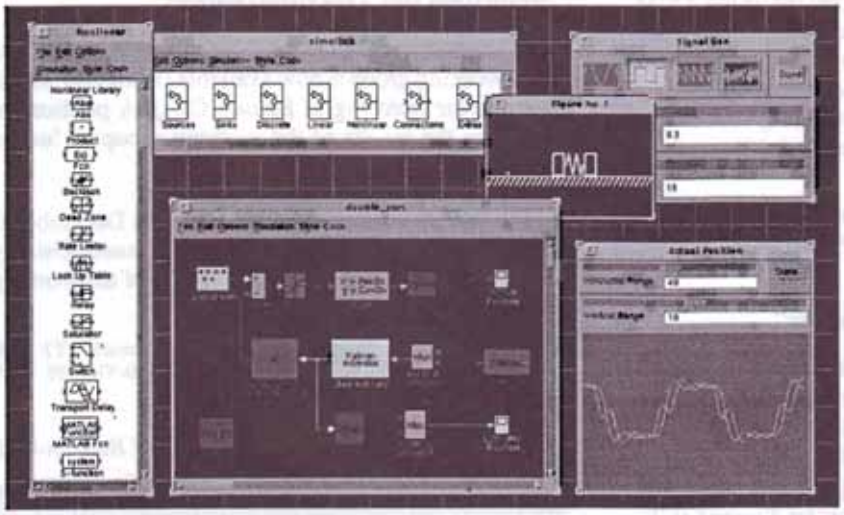
In the near future all members of the working group will receive a short form which asks for their working area, software and hardware knowledge. Copies of all returned forms will be redistributed to those who returned a form. This should help to find a partner with common interest within ASIM.

Place and time of the next working group meeting will be published in the next issue of SNE.

Speaker: Dr. Ingrid Bausch-Gall, BAUSCH-GALL GmbH, Wohlfartstraße 21b, D-80939 München, Tel: +49-89 3232625, Fax: +49-89 3231063, Email: 100564.302@compuserve.com
Vice-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

"Simulation in der Fertigungstechnik"

The last ASIM Working Group conference titled *"Simulation rechnerunterstützte kontinuierliche Verbesserung"* was scheduled for March, 1995, at the University of Nürnberg/Erlangen, Germany. The conference had to be cancelled due to insufficient participation.



Simulating a system with SIMULINK Scope block and MATLAB animation window show results while the simulation is running. You can change parameters during a simulation to do "what if" analyses.

It's time to go nonlinear with SIMULINK®.

SIMULINK gives you a powerful interactive workbench to model, analyze, and simulate physical and mathematical systems. SIMULINK allows you to rapidly model the behavior of complex systems like regional power grids, satellite controllers, aircraft, robotic systems and biochemical processes.

Create Models Graphically

With SIMULINK you can model a dynamic system quickly and easily. Just drag and drop icons into block diagrams — there's no need to write a single line of code.

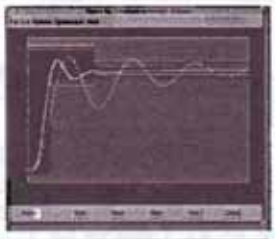
SIMULINK provides over 200 built-in block types from which to build your models. You can also design your own blocks, complete with custom icons. Plus, blocks can be grouped to create a model hierarchy.

Extensive Model Types

To model a complete range of system behaviors, you can combine linear and nonlinear elements defined in discrete-time, continuous-time or as a hybrid system.

Interactive Simulation

SIMULINK makes it easy to run simulations and monitor results interactively. Just attach signal source blocks to generate input signals and oscilloscope blocks to monitor outputs. For "what if" analyses, change parameter settings while the simulation is running; you see the changed outputs immediately. And with SIMULINK's trimming methods, you can find your system's equilibrium point automatically.



Graphically tune parameters in a nonlinear system with the Nonlinear Control Design Toolbox.

An Open Architecture

Because SIMULINK is based on the open and extensible architecture of MATLAB®, you can easily create blocks, customize existing blocks, build custom block libraries, and use MATLAB's toolboxes including:

- Signal Processing
- System Identification
- Control System Design
- Robust Control
- μ-Analysis and Synthesis
- Neural Network
- Optimization
- Nonlinear Control Design

New Toolboxes for Nonlinear Optimization and Real-time Code

For optimizing nonlinear control systems, the new Nonlinear Control Design Toolbox gives you access to advanced time-domain-based optimization methods.

SIMULINK's Real Time Workshop lets you automatically generate real-time code from models, for embedded control, rapid prototyping, and standalone simulations on your target hardware or on DSP hardware.

SIMULINK Highlights

Modeling Tools

- Block Library with 200+ blocks
- Custom blocks and libraries
- Custom icon editor
- Differential equations
- Linear and nonlinear
- Discrete-time, continuous-time, and hybrid
- Multi-input-multi-output
- Hierarchical modeling
- Write equations in Fortran, C or MATLAB

Simulation and Analysis

- 7 integration methods for fixed, variable-step and stiff systems
- Interactive simulations with live displays
- Batch simulations from MATLAB command line
- Monte Carlo simulations
- Access to MATLAB's extensive toolboxes
- Trimming: determine stable equilibrium points
- Linearization

SIMULINK 1.3/MATLAB 4.2 is now available on Unix workstations and MS-Windows-based personal computers. For a list of new features and further details:

Call +44 1903 821266

or

Email:radata@ibmpcug.co.uk

The MATH WORKS Inc

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For this reason the next event organized by the ASIM working group will be a working group meeting which will take place at the *Fraunhofer-Institut für Materialfluß und Logistik* in Dortmund, Germany, on 20th of June, 1995. Special topics of this meeting will be the discussion of further working group activities and the preparation of the next conference.

Speaker: Prof. Dr.-Ing. A. Kuhn, Fraunhofer-Institut (IML), Joseph-von-Fraunhofer-Straße 2-4, D-44227 Dortmund, Tel: +49-231 9743 132, Fax: +49-231 9743 234

"Simulation in der Betriebswirtschaft"

In March 13th to 15th the Fifth Biannual Symposium "Simulation for managerial decision support - new tools and approaches in practice" has taken place at the Maritim Hotel Braunlage (Harz Mountains) in cooperation with the German Society for Operations Research (DGOR) and the Society for Computer Science (GI). Experts and professionals from industry, science and public services met to increase the exchange of experience on the application of simulation in business administration and neighboring fields. The participants came from Germany, Switzerland and Poland.

The 22 papers of the symposium covered the following areas: basics (3), simulation tools (5), optimal decision making (3), long range planning (3), production planning and control (2), traffic planning (1), education (3), and environmental studies (2). The symposium has been completed by a planning game which reflected the financial budgeting situation of a big german city.

The papers are published in proceedings (in German) which can be ordered from: Prof. Dr. J. Biethahn, Georg-August-University of Göttingen, Platz der Göttinger Sieben 5, D-37073 Göttingen. The subscription price amounts to DM 55,- plus shipping charges.

In addition, in 1996 a comprehensive state of the art survey of selected papers on simulation in business administration will be published by the organizing committee. In question of this, please, contact: Prof. Dr. Th. Witte, University of Osnabrück, Luisenstr. 16, D-49074 Osnabrück.

The sixth symposium "Simulation for managerial decision support - new tools and approaches in practice" is announced for spring of 1997 at the traditional place in Braunlage. For further information please contact Prof. Biethahn (address see above).

Speaker: Prof. Dr. W. Hummeltenberg, Universität Hamburg, Institut für Wirtschaftsinformatik, Max-Brauer-Allee 60, D-22765 Hamburg. Tel.: +49-40 / 41 23-40 23, Fax: +49-40 / 41 23-64 41

"Simulation von Verkehrssystemen"

ASIM-Mitteilungen Nr. 41, with models and results of the working group is now available (Price DM 35,00; please order from Ingrid Bausch-Gall). A publication collecting the results of the working group in further simulation models is in preparation.

The working group will meet again on December 1, 1995 at the Fraunhofer Institute in Dortmund. Usually more than 40 persons visit the meetings of the working group. For more information contact:

Speaker: Karl-Heinz Münch, SIEMENS AG, Bereich VT2 SYS, Ackerstraße 22, D-38126 Braunschweig, Tel: +49-531 226 2225, Fax: +49-531 226 4305.

Ingrid Bausch-Gall

Simulation and Automatisation
Fuzzy Control for Automatisation (3rd part)

COMETT Course
September 7 - 8, 1995
Technical University Vienna

The course "Simulation and Automatisation" within the COMETT II program of the EU offers an introduction for engineers, scientists and interested people from other fields to modern methods for computer simulation of and for automatisation.

The first and second part of this course dealt with discrete simulation. The third part is independent of the others and deals with the technical aspects of automatisation by means of simulation. After a short introduction into basic principles of (optimal) control for automatisation (of machines, robots, etc.) principles and applictions of the new tool **Fuzzy Control** are considered. Specific Software tools and general ones (MATLAB) will be discussed.

Further information:
Prof. Dr. F. Breitenecker, Dept.Simulation Technique, TU Vienna, Wiedner Hauptstraße 8-10, A-1040 Vienna
Tel. +43-1-58801-5374, Fax: +43-1-5874211,
Email: fbreiten@email.tuwien.ac.at
Online Info: **<URL: http://eurosim.tuwien.ac.at/>**

AES

AES, Asociación Española de Simulación (Spanish Simulation Society), is an Observer Member of EUROSIM.

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

CSSS

In the last months the Czech and Slovak Simulation Society organised two conferences. The first was a *Memorial to Ing. Mian Kotva*, CSc., with the title "Advances in Simulation Models Creation and Exploatation". The Memorial took place 18.-20.4.95 at Zabreh na Morave. There were 55 members from the Czech and Slovak republics and 11 members from Germany, the UK and Poland. It was very kind of Dr. Richard Zobel, secretary of EUROSIM, to bring us a memorial of Milan Kotva from his last visit to the UKSS Conference and to speak briefly about him.

The second conference took place at the University of Transport and Communications in Zilina on May 16th-17th 95, as *ZEL'95, Computer Simulation of Railway Transport* . There were 95 visitors from the Czech and Slovak republics and 41 from Germany, Switzerland, the Netherlands, Austria and Poland. There was also the Director General of the Slovak Railways and an official representative of the Ministry of Transport and Communications of the Slovak republic. During the conference software useful for simulation in Railway Transport was presented by members from Siemens, AEG, Alcatel and HaCon. The conference was succesful and the organisers prepared for ZEL'96 next year at the same time.

During May work for the *European Simulation Multiconference '95*, Prague, Czech Republic, on June 5-7, 95 was completed. The members from CSSS who are working on the conference committee hope that ESM'95 will be a scientific and social event, as a start for the future.

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Mikulas Alexik

DBSS

General Information

The Dutch Benelux Simulation Society (DBSS) was founded in July 1986 for the purpose of creating an organization of simulation professionals within the Dutch language area. DBSS has actively promoted creation of similar organizations in other language areas. DBSS works in close co-operation with the EUROSIM members, and is affiliated with SCS International and IMACS.

DBSS-Membership

Both corporate entities (companies, institutes, etc.) in the Dutch/Flemish area of Benelux and individuals from anywhere are welcome to join DBSS as full corporate or individual members. They receive 3 copies per year, free of charge, of *EUROSIM - Simulation News Europe*. Elsevier Science B.V. offers them a discount on the subscription fee of the EUROSIM journal *Simulation Practice and Theory*. They enjoy reduction of the fees attending congresses, conferences, symposia organised by sister societies of EUROSIM.

The membership fee amounts to just Dfl. 50,- or Bfr. 900,- for individual and the double for corporate members. Those interesed in joining DBSS are invited to write to:

Dutch Benelux Simulation Society Secretariat:
Computing Centre
P.O. Box 354, 2600 AJ Delft, The Netherlands
Tel. +31-15 78 5698, Fax: +31-15 78 3787
E-mail: Zuidervaart@rc.tudelft.nl

(Please mention your name, affiliation and address and indicate whether you are interested in individual or corporate membership).

Membership fee 1995

Members of DBSS are kindly requested to pay their membership fee for 1995 on giro-account 3582241, J.C. Zuidervaart, Leeuwerikplantsoen 27, 2636 ET Schipluiden, The Netherlands, mentioning: DBSS membership 1995.

Coming Events

June 10-12, 1996 the international EUROSIM conference "**HPCN Challenges in telecomp and telecom: parallel simulation of complex systems and large-scale applications**" will take place in the Aula Conference Centre in Delft, The Netherlands.

The opportunity is still open to send your abstract to the Scientific Committee. Deadline: July 15, 1995. For more information, see page 37.

J. Zuidervaart

FRANCOSIM

FRANCOSIM's legal seat is at the following address:

FRANCOSIM, Maison de la Productique
F - 42300 Roanne

Phone: +33-77 70 80 80,
Fax: +33-77 70 80 81

Our organisation was created in 1991 and aims to the promotion of simulation in Education, Industry, and Research. It gathers members of these three fields and tries and develops interaction between all of them, via working sessions and meetings. It informs its members of any event relating to simulation in the concerned countries.

Subscription rates:

FF 275,-	for individuals
FF 1000,-	for large companies and universities, giving right to a five-people participation, information and papers being sent to each of them
FF 50,-	for students

New Events to Come

Discrete event system simulation:

Utilisation de la simulation en gestion de Procustion. Clermont-Ferrand, 14th June - IFMA. This working session is suported by CNRS and AFCET and is at the initiative of Prof. Pierreval. Any person interested in the proceedings may contact N. Sarles at FRANCOSIM.

Continuous Event System Simulation:

This group meets 5 to 6 times a year around Prof. Hamam at: ESIEE school, Cité Descartes 2, boulevard Blaise Pascal, F-93162 Noisy le Grand, Tel: +33-1-45 92 65 00, Fax: +33-1-45 92 66 99. The next meeting will be held September 14 at 14.00.

N. Sarles

HSTAG

General Information

HSTAG (Hungarian Simulation Tools and Application Group) established in 1981 is 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 contributes to the enhancement of exchanging information between the Hungarian simulation community and the simulation communities abroad. HSTAG deals with the organization of lectures, exhibitions, demonstrations, round table discussions and conferences.

Activities

HSTAG as a co-sponsor with IMACS/Hungary participates in the organization of the **IMACS European Simulation Meeting on Simulation Tools and Applications** to be held in Gyor, Hungary (half way between Budapest and Vienna) in August 28-30, 1995.

The scope of the Conference will include methodological questions, presentation of simulation software tools and specific application issues aimed at the solutions of practical problems in various fields. Leading edge issues of the field like artificial intelligence in simulation will be dealt with. Simulation software demonstrations will also take place during the Meeting. The official language of the Meeting as well as that of the Proceedings volume will be English.

It seems that in accordance with the three former IMACS European Simulation Meetings we have organized in Hungary in 1980, 1984 and 1990 this Meeting will have participants from all over the World. Up to now scientists from ca. 20 countries have indicated their intention to participate. Also exhibitors have expressed their intent for demonstrating simulation tools.

The Meeting will take place at the Szechenyi Istvan College in Gyor. It is hoped that the historical town - the Mayor of which will give a reception for the participants of the Conference - will provide a pleasant venue for the Meeting.

Registration fee (including the proceedings volume, reception, banquet, concert, etc.) is US$ 220. Further information can be obtained from:

Contact Address

Prof. András Jávor, Ph.D., D.Sc. (Chairman)
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and Computing Techniques
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Phone: +36 1 1699499, Fax: +36 1 1601290
E-mail: javor@sunserv.kfki.hu

A. Jávor

ISCS

General Information

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

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

Franco Maceri	(chairman)
Felice Cennamo	(vice-chairman)
Vincenzo Grassi	(treasurer)
Mario Savastano	(secretary)

Membership

At present ISCS counts 132 members: 6 institutional, 4 honorary, 120 regular and 2 affiliate.

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

Contact Address

For further information or application for membership, please contact:

ISCS
c/o Dipartimento Ingegneria Elettronica
Università di Roma "Tor Vergata"
Via della Ricerca Scientifica
I-00133, Roma, Italy
Phone: +39 6 7259.4477
Fax: +39 6 2020519
E-mail: grassi@info.utovrm.it

Activities

The steering committee and ISCS members are promoting the following activities:

1. The organization and sponsoring of **Summer Simulation Schools** (S3) with the aim of extending the knowledge about simulation theory, tools, and applications.

A course on Pharmacokinetics will be held in Varese, Italy, on September 10-15, 1995: International Course on Pharmacokinetics for the pharmacist and organized by University of Milano, University of Pavia, and Bragg Creek Institute for Natural Philosophy. Participation is limited to 40 persons. Contact: Scuola di Modelli Matematici in Biologia e Medicina, c/o Università di Varese, Facoltà di Scienze, Via Ravasi 2 I-21100 Varese, Italy. Fax: +39-332-281308, E-mail: mapiro@imiucca.csi.unimi.it.

2. The sponsoring of the "***Seminario di Informatica***", a periodic scientific seminar held at the University of Roma "Tor Vergata". Main topics are simulation, performance evaluation, parallel and distributed computing, and high speed networks.

In the period March-May two cycles of lectures were given by Prof. Marisela Hernandez (LAMIFA, Université de Picardie, Amiens, France) on G-networks analytical models and simulation for evaluating load balancing strategies in distributed systems, and Prof. Dimiter Avresky (Department of Computer Science, Texas A&M University) on effective approaches for achieving fault-tolerance in parallel and distributed systems.

3. The organization of **Working Groups** meetings among ISCS members interested in the same simulation field, in order to provide a forum for presentation of results, exchange of ideas and scientific discussions. At present, the following Working Groups have been established: Simulation in Industry and Management, Simulation in Agriculture and Environmental Sciences, Simulation in Training and in Education, Simulation in Biology and Medicine, Simulation in Electrical Engineering, Concurrent and Distributed Simulation, Software and Hardware for Simulation, Expert Systems and Simulation.

ISCS members are warmly invited to promote new Working Groups or to join existing ones. Contact the ISCS secretariat at the address reported above for further information.

Notice to ISCS members

The annual meeting of ISCS members is scheduled to be held on November 1995 in Rome, at the Department of Electronic Engineering, University of Rome "Tor Vergata". On that occasion we are planning to organize a meeting between members coming from academia and industry.

Unfortunately, there are still members who did not pay their membership fee for 1994 up to now. We kindly request you to pay the due fee as soon as possible on the post account no. 44616001 of the Italian Society for Computer Simulation.

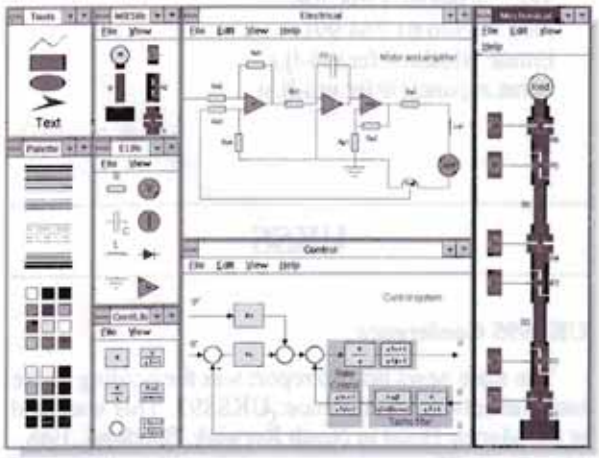
M. Colajanni

Dymola

Dynamic Modeling Laboratory

four essential parts of object-oriented modeling

Dymola language promotes reuse of library models.
Dymodraw allows graphical model composition.
Dymosim for efficient continuous/discrete simulation.
Dymoview performs 3D animation and plotting.



Modeling of mechatronic system in Dymodraw.

Animation of simulation results in Dymoview.

Dymola™

Dynamic Modeling Language – translator:
- Automatic causality analysis
- Symbolic solution of equations and index reduction
- Solution of algebraic loops
- Automatic handling of time- and state events
- Output for Dymosim, ACSL, SIMNON, SIMULINK
- Generates Fortran or C routines

Dymodraw™

Dynamic Model Drawing:
- Graphical model editor and browser
- Drag submodels from libraries
- Parameter forms
- Connect graphically
- Icons – polygons, circles, text, color etc.
- Text editor for declarations and equations

Dymosim™

Dynamic Model Simulator:
- Handles ODE and DAE
- DASSL, LSODE, DOPRI, DEABM etc.
- Stiff models
- Linearization
- Proper treatment of time- and state events
- MATLAB interface

Dymoview™

Dynamic Model Viewer:
- 3D animation
- Boxes, spheres, cylinders – predefined visual classes
- Import of visual objects in DXF format
- Data from Dymosim, ACSL, MATLAB, Simnon
- Hidden surface removal, shading: special PC board
- Plotting

Additional information: Dr. Hilding Elmqvist · Dynasim AB · Research Park Ideon · S-223 70 Lund · Sweden
Phone: +46-46 182500 · Fax: +46-46 129879 · E-mail: Info@Dynasim.se
Available on PC/Windows and Unix/Motif.

Dynasim

SIMS

The Scandinavian Simulation Society, SIMS, has at present nearly 300 members from Denmark, Finland, Norway and Sweden. For 36 years SIMS has served as the regional society in Scandinavia, gathering individuals and organisations involved in simulation. The activities have been concentrated on arranging annual meetings and courses, delivery of information letters, and co-operation at European and international level in the field of simulation.

How to join SIMS

Just send an informal application or recommendation for membership to the SIMS secretariat:

SIMS
c/o Eija Karita Puska
VTT Energy, Nuclear Energy, P.O.Box 1604
FIN-02044 VTT, Finland
Tel: +358-0-4565036, Fax: +358-0-4565000
Email: eija-karita.puska@vtt.fi

E.K. Puska

SLOSIM

On the conference UKSS'95 (North Berwick, Scotland) SLOSIM became an observer member of EUROSIM.

Activities

One of the beginning activities of our young organization is the presentation of modelling and simulation groups in Slovenia. The presentation of one group that was held in October 27, 1994 is printed on page 23.

Further Events

SLOSIM is one of the cooperative societies in the organization of Electrotechnical and Computer Science Conference ERK'95. Some information from the Call for papers: The meeting will take place in Portoroz (Adriatic coast), Slovenia from September 25 to September 27, 1995. The conference is bilingual with presentations in English and Slovene. The following areas will be presented: electronics, telecommunications, automatic control, simulation and modelling, robotics, computer and information science, artificial intelligence, pattern recognition, biomedical engineering, power engineering, measurements.

For other information see calendar of events or contact the SLOSIM chairman.

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borut.zupancic@fer.uni-lj.si

B. Zupancic

UKSS

UKSS95 Conference

The main news item to report was the holding of the biennial national conference: UKSS95. This was held at the Marine Hotel in North Berwick, Scotland, 19th - 21st April. The venue was superb with, courtesy of some cool but clear and sunny weather, lovely views across the golf course to the Firth of Forth and beyond.

The meeting was smaller than usual. However the 30-odd papers presented were of a very high quality. Theoretical topics covered included: language development and construction, output analysis, optimization. Particularly strong were streams on applications in medicine, queues, engineering, manufacturing and production problems.

Though a national conference, it is a pleasure to record a strong attendance from our European colleagues, especially from ASIM. Our thanks to you for giving us such good support.

The plenary speakers were Professor Paul Luker, recently returned from the States to head the School of Computing Sciences at De Montfort University, Professor Ralph Huntsinger, doyen and coordinator of the McLeod Institutes of Simulation Science Centers, and Professor Felix Breitenecker, President of the EUROSIM Federation. Paul spoke about the difficulty of getting simulation recognised as being a subject in its own right. A perceptive talk was nicely balanced with many personal reminiscences and experiences. Ralph spoke about the McLeod Institutes and described some of the excellent work taking place in the Centers. Included in his talk were demonstrations of some of the very high quality software available as shareware amongst Institute members. Felix described trends and developments in simulation software and discussed the

library of software comparisons being built up by EUROSIM. Felix is to be congratulated on the excellent work that he has initiated in this regard. The work, together with its dissemination through this newsletter is a valuable enhancement of simulation practice.

The Conference visit to Torness Nuclear Power Station was enjoyed by all those attending, as was the excellent Conference Dinner.

Last, but not least, we would like to thank the Exhibitors for coming to show us the latest in packages and applications, and for participating so fully in the Conference.

UKSS Annual General Meeting

The Annual General meeting of the Society was held during the National Conference. The Society is facing a watershed, with the need to expand both its membership and its activities to ensure a positive future.

Elizabeth Rimmington announced her intention to step down after ten years as Membership Secretary of the Society and its forerunner the UK Simulation Council. The Meeting placed on record its grateful appreciation for the excellent service that she has rendered.

The following were elected as Officers:

Chairman - Rob Pooley,
Secretary - Russell Cheng,
Treasurer - Anona Hawkins,
Membership Secretary - Chris Bowyer,
International Liaison Representative - Richard Zobel.

The following additional Committee Members were elected: David Davies, Ray Frank, Gwyn Jones, Paul Luker, David Murray-Smith and Barrie Thompson.

Membership

Enquiries concerning membership: please contact

Mr. Chris Bowyer,
CAM UK, Beckett House,
14 Billing Road, Nothampton, NN1 5AW, England,
Tel: +44-1604 259036/7/8,

or Prof. Russell Cheng,
Institute of Mathematics and Statistics,
University of Kent at Canterbury,
Canterbury, Kent, CT2 7NF, England,
Tel: +44 1227 764000 x 3665,
email: R.C.H.cheng@ukc.ac.uk

Russell C. H. Cheng

CROSSIM

The Croatian Society for Simulation Modelling is co-operating in the conference **ITI '95**, 17th International Conference *Information Technology Interfaces*, Pula, Croatia, June 13-16, 1995.

ITI '95 is an annual international conference devoted to exchange of experience in research on computing, information systems, software engineering, artificial intelligence, modelling and simulation, information technology, statistics and related fields.

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LSS

LSS (The Latvian Simulation Society) was founded in 1990 as the first professional simulation organization within the republics of the former Soviet Union.

Simulation activities at the Riga Technical University were described in March, 1993 (p. 26) and March, 1994 (pp. 39-40) issues of EUROSIM-SNE. Currently the department of Simulation and Modelling of the Riga Technical University performs several simulation projects, e.g., simulation of a manufacturing system at the Riga Radio Factory, simulation of transport flows via most loaded roads and crossings in Riga, development of an intelligent, user-friendly, object-oriented simulation system (in cooperation with the department of Applied Mathematics, Biometrics and Process Control of the University of Ghent, Belgium), development of optimization algorithms to tune parameters of simulation models. There are also common activities with the department of Economic Information Systems of the Linkoping University, Sweden (in the field of industrial simulation training), with the Institute of Simulation and Graphics of the Otto-von-Guericke University of Magdeburg, Germany (in simulation of transport systems), and with the department of Control Processes of the Sankt-Peterburg State Electro-Technical University, Russia (in simulation of control systems). There are also intensive activities in the education area. For example, the department cooperates with the department of Industrial Management of the University of Ghent, Belgium in development of courses, where simulation is used to make and validate managerial decisions (e.g., the course "Simulation of Socio-Economical Systems").

For further information please contact:

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SCS

(continued from SNE 13)

In October 1994, SCS made its second foray into the Eastern part of Europe, when it held its ESS conference in Istanbul, Turkey. The conference, which was superbly organised by Ali Ruza Kaylan and Tuncer Oren, started on the Sunday with three tutorials, two by Martin Wildberger, one by Osman Balci and one by Wolfgang Kreutzer. We never had so many volunteers helping out at the conference desk and for each and every room, as we had at this conference. While it poured outside (what would you expect, Istanbul is truly a part of Europe) and the wind snagged at the drenched conference flags the conference participants (some 160 in total) enjoyed the 120 presentations, the exotic food (this is not a place for people on a diet!), and the incredible social events: the conference dinner with it's incredible performance (18 traditional dancers, performing ancient Turkish folkdances). We even ventured out in the evening for a moonlight (in between clouds) trip up the Bosphorus, where generous helpings of raki were served to us unsuspecting mortals. I think my room definitely simulated 6 degrees motion plat-

form. Next to it being a scientific event, the conference also functioned as the motor for setting up the Turkish Simulation Society (Contact address: Prof. Ali Riza Kaylan, Bogazici University, Dept. of Industrial Engineering, 80815 Bebek, Istanbul, Turkey. Tel: +90. 212.263.1540 (ext. 2075), Fax: +90.212.265.1800). Proceedings of the above events are available from the address mentioned below.

Nineteen Ninety Four, also saw several changes in the way in which SCS would operate in Europe in the future. Due to financial pressures and new VAT laws, SCS decided to set up a financial subsidiary in Europe, operating under the auspices of the European Simulation Council, just like in the US where the Simulation Councils Inc. operate under SCS. This should improve the smooth running of the European Office and make for a steadfast operation. Secondly, SCS has contracted a professional bookseller (Malcolm Clarke Associates, based at The Rackhay, Queen Charlotte Street, Bristol BS1 4HJ, United Kingdom), to sell its European Proceedings, world-wide, except for the US. European SCS members, meanwhile, will receive their books from SCS in Belgium. Thirdly, SCS in Europe is starting its own bookseries called: Frontiers in Simulation. Proofed by an international committee, these books will give prospective authors the possibility to publish their work (research, PhD Thesis, etc.) within the span of three months. The books will be printed in English, French or German.

Last but not least, the simulation community lost in 1994 two well-cherished members, one being Ben Clymer, who died during the SCSC in San Diego and Milan Kotva, the conference chairman of the 1995 ESM in Prague. Both will be deeply missed.

SCS organises this year in Europe the following events:
September 11-13, TECHNOMAN, Bruges, Belgium.
ESS95, October 26-28, Erlangen, Germany.

For 1996:
April: CEEDA 96, Cambridge, United Kingdom.
June: ESM 96: Budapest, Hungary.
September: MEDIACOMM 96, United Kingdom.
October: ESS 96

For 1997:
April: CEEDA 97, Cambridge, United Kingdom
June: ESM 97, Warsaw, Poland.
September: MEDIACOMM 97, United Kingdom.
October: ESS 97: Passau, Germany

For further information on SCS activities in Europe, please contact: Philippe Geril, SCS, European Simulation Office, University of Ghent, Coupure Links 653, B-9000 Ghent, Belgium. Tel: +32.9.233.77.90, fax: +32.9.223.49.41, E-mail: Philippe.Geril@rug.ac.be, Tel/Fax at home: +32.59.800.804, WWW: <URL:http://faui30t.informatik.uni-erlangen.de:1200/Misc/ESS95.html>

Philippe Geril

Presentation of Simulation Centers

Modelling and Simulation Groups in Slovenia

Presentation of the Group:

Laboratory for Simulation and Automatic Control (prof. R. Karba)
Laboratory for Industrial Process Control (prof. D. Matko),
Faculty of Electrical and Computer Engineering,
University of Ljubljana,
Trzaska 25, 61000 Ljubljana, Slovenia,
Tel: +386 61 1768 417, Fax: +386 61 264 991.

Laboratories activities:

Research work is oriented to the theory and application of modern methods of computer control, to the adaptive and multivariable control as well as to modelling and simulation of dynamic processes.

Fuzzy systems, neural networks, artificial intelligence and expert systems usage are under investigation in the last period. Significant stress is given also to the computer aided control system design and simulation tools development and application. The mentioned methods are transferred to different fields where complex control systems can be applied as well as to some interdisciplinary areas (chemical engineering, pharmacokinetics, power plants, biomedicine etc.).

Hardware equipment:

20 PC computers in network (many of them with process interface), Vaxstation 3100, analog parallel processor EAI 2000, industrial controllers, programmable logical controllers, 12 places equipped with laboratory plants for practical training (hydraulic plants, pneumatic plant, mechanical plants - inverted pendulum, see saw, motor generator system, coupled drives, ball and hoop, ...).

Software equipment:

SIMCOS simulation package for predominantly continuous systems (DOS), ANA CACSD program package (DOS, VMS), MATLAB 5.1 mathematical program package with simulation module SIMULINK, various MATLAB toolboxes (Signal processing, Neural network, Spline, System identification, Optimization, Control system design, Robust control, Symbolic math, mi-analysis and synthesis) (WINDOWS), MATRIXx CACSD program package, various MATRIXx toolboxes (VMS), DYMOLA object oriented package for modelling and simulation (DYMODRAW, DYMOSIM, DYMOVIEW) (WINDOWS), GPSS/h simulation package for discrete event systems (WINDOWS), PROOF animation package, FactoryLink program package for the implementation of distributed control systems (DOS), FIX DMACS program package for the implementation of distributed control systems (WINDOWS).

Achievements:

In the laboratories appr. 280 B.Sc., 65 M.Sc. and 20 Ph.D. works were made till now. The members of the laboratories published 12 text books for students and are the authors of 40 papers in international journals. They participated in international conferences with 200 contributions. Two international meetings were organized by the members of the laboratories. Laboratories have important contacts with universities in Darmstadt, Oxford, Little Rock, Arkansas, Brussels, Glasgow, Florence, Hannover, Glamorgan and occasionally with Technical University in Vienna.

In the laboratories more than 80 research and development projects were realized for the domestic users and 10 projects which had international participation. Important current projects are: Environment for the design and implementation of automatic control systems (domestic), Modern approaches to the modelling, simulation and control of dynamic systems (domestic), TEMPUS project: Active learning in automatic control (international), TEMPUS project: *Seminarlehrgang „Rechnergestützter Entwurf (CAE) von Regelungssystemen*" (international).

B. Zupancic, SLOSIM

MISS - McLeod Institute of Simulation Sciences

The McLeod Institute of Simulation Sciences of the Society for Computer Simulation International is a network of semi-independent centers dedicated to advancing the art and science of computer simulation and related fields of scientific interest.

The centers provide a way for persons interested in computer simulation to gather together to form a "critical mass" to work in a common interest professional area.

Some advantages of this network of centers are as follows:

(1) It allows the 'networking' of individuals that are interested in simulation to cooperate in a formal way.

(2) The centers can exchange simulation software developed at the various centers and can act as alpha and beta test sites for new simulation software. The centers can help each other with problems related to the development of simulation software.

(3) The centers allow a formal way to exchange information on the teaching of computer simulation.

(4) The MISS centers allow for the exchange of faculty, research staff, and students between institutions with a clear identification of the area of interest, computer simulation.

(5) The centers are now cooperating to produce basic and advanced textbooks in the area of computer simulation with each center contributing a chapter that is related to the technical area of strength of the particular center. This is an example where the whole is greater than the sum of the parts.

(6) The centers are an effective way of interesting good scientific minds to spend some of their time thinking about computer simulation.

This series will be continued with detailed information.

Ralph C. Huntsinger,
California State University, Chico, USA

Book Reviews

Computer Numerik (in German)
Ch. Ueberhuber
Springer, Berlin, 1995
Vol. 1, 511 pages, ISBN 3-540-59151-6
Vol.2, 515 pages, ISBN 3-540-59152-4

The two volumes of this book are addressing developers and users of numerical software as well as students in engineering and natural sciences. The books help on the one side to obtain knowledge of the basic concepts of numerical algorithms and methods, and on the other side help to choose algorithms and software for certain problems and to work efficiently with these algorithms. The books not only discuss algorithms and methods but also available software for many application areas, taking into account all phenomena of floating point aruthmetic on a computer.

The first volume introduces to basic numeric operations and errors, based on the IEEE floating point representation. In this context quality criterias of numerical software are discussed, and availble software libraries or systems are sketched (NAG, LAPACK, etc.) - users may also find hints how to get advantage of such software systems, for instance from electronic nets or from WWW. The reader learns how to take into account the effect of floating point operations and it becomes clear why 2 + 2 need not necessarily be 4 on a computer. Furthermore, volume 1 deals with mathematical models based on approximation. In various details algorithms and software for interpolation conclude the first volume.

The second volume starts with methods, algorithms and software for Fourier transformations and continues with numerical integration. Of interest, especially for developers of software, is the discussion of recent methods for high-dimensional integration problems. Very important in each application is the solution of systems of linear equations. The book discusses in detail the algorithms, the available software, the choice of the appropriate algorithms, the properties of the systems (condition, etc.), and the validation of the numerical results. The investigations on linear systems are continued in a chapter on eigenvalue analysis and eigenvalue calculation where phenomena and advantages of sparse systems are discussed. In the following iteration algorithms for nonlinear (systems of) equations are discussed. Here the reader finds not only hints how to use well known algorithms efficiently but also information about iteration algorithms in general and about modern algorithms. In modern engineering Monte Carlo Methods become more and more important. Consequently the second volume concludes with an overview on random number generators, etc.

The books offer very good balance between theory and application: the books not only deal with numerical algorithms, the books don't contain only numerical recipies and they are both enriched with basics of computer numerics. The two volumes can be highly recommended for newcomers in the area as well as for people working for a long time in or with computer numerics. A minor point of critics may be - from the viewpoint of simulation - that methods for solving differential equations are not considered (perhaps they would fill a third volume). Another point may be the fact (the books are in German), that each term for a certain kind of error, for a phenomenon, etc., where an English term is commonly used, it is translated into German, or that the relativley unknown German term is used.

To summarize, the books can be highly recommended for practitioners and students in the area of computer numerics, and the books are worth to be available in every relevant library.

F. Breitenecker, TU Vienna

Machine Learning
Neural Networks, Genetic Algorithms, and Fuzzy Systems
Hojjat Adeli and Shih-Lin Hung
John Wiley & Sons, New York, 1995;
ISBN 0-471-01633-0, 211 pages;

This book presents different approaches for the domain of machine learning, mainly based on neural networks, genetic algorithms and fuzzy systems. The book summarizes also the research of the authors on neural networks and machine learning, embedded into a number of the above mentioned fundamentally different approaches to machine learning. The book also deals with the implementation of (parallel) algorithms for neural network computing.

Chapter 2 starts as introduction with a perception learning model with a hidden layer, chapter 3 continues with a back-propagation learning model (algorithms given in chapter 4), and chapter 5 concludes these considerations with an conjugate gradient learning algorithm for the training of multilayer feedforward neural networks (concurrent implementations discussed in chapter 6).

The following chapters discuss other paradigmas and implementations: hybrid genetic / neural algorithms, implementations for distributed memory computers, and a fuzzy neural network learning model. Although each chapter starts with an introduction, sometimes the primary goal of the book is not clear (the authors indicate in the general introduction "the focus of the book is neural networks computing").

The book is more a collection of different individual contributions than a closed presentation of a certain area. Especially the chapter on genetic algorithms shows some inconsistencies and introduces too much formalism for relatively simple items. The book is more suited for specialists in the area of machine learning, for stimulating discussions and new developments.

M. Salzmann, TU Vienna

Comparison of Simulation Software

EUROSIM - Simulation News Europe features a series on comparisons of simulation software. Based on simple, easily comprehensible models special features of modelling and experimentation within simulation languages, also with respect to an application area, are compared.

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

Seven comparisons have been defined in previous issues of *EUROSIM - Simulation News Europe*, the series will be continued. Furthermore, a special comparison of parallel simulation techniques has been defined. Definitions of the comparisons are available from the editors or via Internet (`simserv.tuwien. ac.at`).

Comparison 1 (Lithium-Cluster Dynamics under Electron Bombardment, November 1990) deals with a stiff system of 3rd order. This comparison tests features for integration of stiff systems, for parameter variation, and for steady state calculation. A preliminary summary can be found in SNE 6, November 1992.

Comparison 2 (Flexible Assembly System, March 1991, comments July 1991) for discrete simulation languages compares features for submodel structures, control strategies, and optimization of process parameters. A preliminary evaluation can be found in SNE 4.

Comparison 3 (Analysis of a Generalized Class-E Amplifier, July 1991) focusses on simulation of electronic circuits and requires features for table functions, eigenvalue analysis, and complex experiments.

Comparison 4 (Dining Philosophers, November 1991) is a more general task involving not only simulation but also different modelling techniques like Petri nets. The comparison concentrates on the modelling technique in case of concurrency and on different strategies (priority levels) in case of deadlocks.

Comparison 5 (Two State Model, March 1992, revised July 1992) primarily addresses simulation tools with very high accurracy. It checks integration and state event handling with high accurracy.

Comparison 6 (Emergency Department - Follow-up Treatment, November 1992) addresses discrete simulation languages and tests features for modelling, concepts of availability, and complex control strategies.

Comparison 7 (Constrained Pendulum, March 1993) for continuous simulation languages, checks features for model comparison, state events, and boundary value problems.

We invite all institutes and companies developing or distributing simulation software to participate in this comparison. Please, simulate the model(s) and send a report to the editors in the following form (on diskette, any word processing format, or per e-mail):

- short description of the language
- model description (source code, diagram, ...)
- results of the tasks with experimentation comments max. 1 page (For publication in *EUROSIM - Simulation News Europe* all contributions that exceed one page will be modified by the editors to fit into one page.)

We also invite you to prepare demo programs, test versions, and animations on diskette. Please send diskettes to the editors. The demos will be made available on an ftp server (`simserv.tuwien.ac.at`).

Parallel Comparison (March 1994). This new type of comparison deals with the benefits of distributed and parallel computation for simulation tasks. Three test examples have been chosen to investigate the types of parallelisation techniques best suited to particular types of simulation tasks. Reports of solutions should not be more than one and a half page in length.

A special interest session at the **EUROSIM'95 Congress** will deal with different kinds of comparisons.

The following table shows the number of solutions published in each issue of *EUROSIM - Simulation News Europe* (SNE) for the different comparisons. This issue welcomes the 100th solution.

SNE No.	Comparison							
	C1	C2	C3	C4	C5	C6	C7	CP 1
0	Def							
1	5	Def						
2	4	4	Def					
3	4	3	3	Def				
4	1	5	5	3	Def			
5	4	-	1	1	2			
6	-	2	-	2	1	Def		
7	1	2	1	2	-	1	Def	
8	-	1	-	-	-	1	3	
9	-	-	-	-	-	2	3	
10	1	2	-	-	-	2	2	Def / 1
11	2	2	1	-	1	-	-	2
12	1	-	1	-	-	-	2	3
13	-	-	-	-	-		3	1
14	3	-	1	-	-	-	2	-
Total	26	21	13	8	4	6	15	7

Comparison 1 - SIMNON

SIMNON is an easy to handle simulation tool. Models are described as continuous or discrete systems in the Editor-Window. There is no matter about sorting statements; this is done by SIMNON when the system is activated, that means translated into machine-code. Models can also be built by connecting discrete and/or continuous subsystems, a very easy to survey structure. SIMNON is also capable of real-time-simulation, e.g. to control a physical process. The simulation is started either by mouse control or with a command in the command-dialog window. There you can also change parameters, select integration algorithms and give the commands for plotting graphics in a plot window. For this comparison we used SIMNON/PCW, Version 1.1 for MS Windows 3.1.

Model description: The following model was built up by using the predefined program mask. It would also be possible to write all the equations, parameter- and initial values without sorting.

```
CONTINUOUS SYSTEM LICLU
" States and derivates:
STATE r m f
DER rdot mdot fdot
" Initializations:
r:84.99
m:1.674
f:9.975
" Equations:
rdot=-dr*r+kr*m*f
m+kf*f*f-kr*m*f
fdot=dr*r+2.0*dm*m-kr*m*f-2.0*kf*f*f-lf*f+p
lf=10^lfp
" Parameter values:
kr:1.
kf:0.1
dr:0.1
dm:1.
lfp:2.
p:0
END
```

Results: Task a), Comparison of integration algorithms: SIMNON offers four integration algorithms: two of Runge-Kutta type (RKF23 and RKF45) a Dormand-Prince-algorithm (DOPRI45R) and the Euler algorithm (EULER). All of them are working with automatic step size, only Euler works with fixed step size. The stiff system was simulated with a 386DX-25MHz-PC with 387 co-processor with all of the four algorithms. The results for a period of 10s with constants lf=1000, p=0 and error tolerance 1e-3 are presented in the table below:

algorithm	max length of a step	time
Euler	0.001	23s
RKF23	auto	21s
RKF45	auto	fpe
RKF45	0.01	15s
DOPRI45R	auto	fpe
DOPRI45R	0.01	26

fpe=floating point error

Since there is no special algorithm for stiff systems it was necessary to make experiments by varying the error tolerance and stepsize.

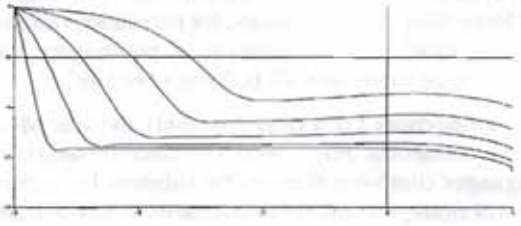
Task b), Parameter variation: This can be done interactively in the command-dialog window by formulating an assignment loop. In order to plot the F-centre concentration (f) scaled logarithmically as a function of time (also scaled logarithmically) we had to supply the following lines to the program:

```
TIME t
lgt=log(t)
lgf=log(f)
```

After simulating with the Runge-Kutte-23 algorithm with automatic stepsize from 0.001 to 10 seconds and error tolerance 0.001 and the parameters lfp=2, 2.5, 3, 3.5, and 4 we could plot the following diagram.

lfp	computation time
2	4s
2.5	10s
3	30s
3.5	93s
4	291s

F-center-concentration as a function of time:



Task c), Steady state calculation: SIMNON has no special algorithm for steady state finding. So we had to simulate the system over a long period and to terminate for instance with CTERM (Conditional **Termination**). We defined the condition with abs(fdot^2+rdot^2+mdot^2) < 0.001 and started the experiment with the same integration parameters as in b) and lf=1000. For p=0 the program stopped at t=56.2481 with

rdot	mdot	fdot
-0.031428	-0.00349104	-0.0000101248
r	m	f
0.314315	0.034919	0.000101276

For p=10000 we stopped the program after a computation time of about 8 hours at t=1269 with.

rdot	mdot	fdot
-1.58117	1.28698	161.542
r	m	f
997.708	9.97798	9.84063

Conclusion: Although SIMNON is a valuable simulation tool, in this example the lack of a Gear algorithm and of logarithmic plots is evident.

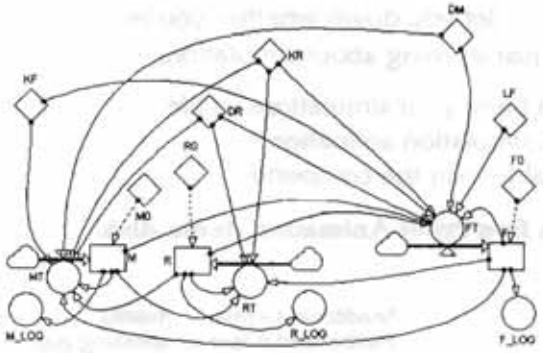
J. Plank, TU Vienna, Dept. Simulation Techniques.

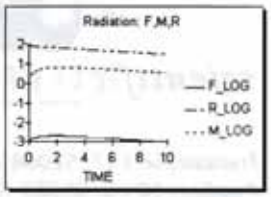
Comparison 1 - POWERSIM

POWERSIM is a Windows based simulation program for modelling and simulation of dynamic systems. A mouse and menu driven input facility allows to construct block diagram models, to control the experiments, and to process output data.

POWERSIMs modelling philosophy is based on the System Dynamics Approach. Main element in desigining models is the "Level"-element, whose value is incrementally changed during a simulation. A Level is an "accumulator" (integrator), receiving flows of input or delivering flows for output (rates) from timestep to timestep. The causal connections between levels and rates are realized by links which show the direction of flow of data. The results of simulation can be presented by charts and tables, also within the modelling layout.

Model Description: The following "worksheet" shows the model definition and results of the problem under investigation. In the modelling layout rectangles define the levels (the state variables f, m and r), circles define auxiliary variables (internally defined by a user-defined formula and acting as rate, if fixed to a flow arrow; in this case the nonlinear terms of the equations), and squares define parameters; intial values for the levels (the state variables) are defined constants fixed to the levels by dashed lines. Results may be displayed as graphs or as tables:





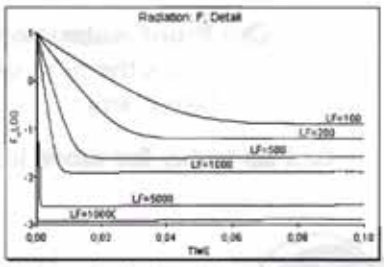
TIME	F	FT	M	MT
0,0	9,98	-99.774,75	1,67	0,0769
0,1	0,0013	0,00113	2,32	6,09
0,2	0,00141	0,001	2,89	5,43
0,3	0,00151	0,000884	3,41	4,84

In addition to the models graphical definition the corresponding (automatically generated) equations can be viewed:

Results: Task a) The table shows the computing times using a 486 DX2/66 PC; POWERSIM doesn't support special integration algorithms for stiff systems (fixed stepsize 0.001):

Integration Algorithm	Comp.Time
Euler	32 s
Runge Kutta 2nd order	34 s
Runge Kutta 3rd order	36 s
Runge Kutta 4th order (fixed stepsize)	38 s
Runge Kutta 4th order (variable stepsize)	40 s

Task b) One feature of POWERSIM is the use of co-models, which can be synchronized with a main model. Automatic parameter variations may be defined in such co-models as a loop over the model under investigation, making it easy to collect data of multiple runs and display them together (the parameter lf was varied by values 100, 200, 500, 1000, 5000, 10000):

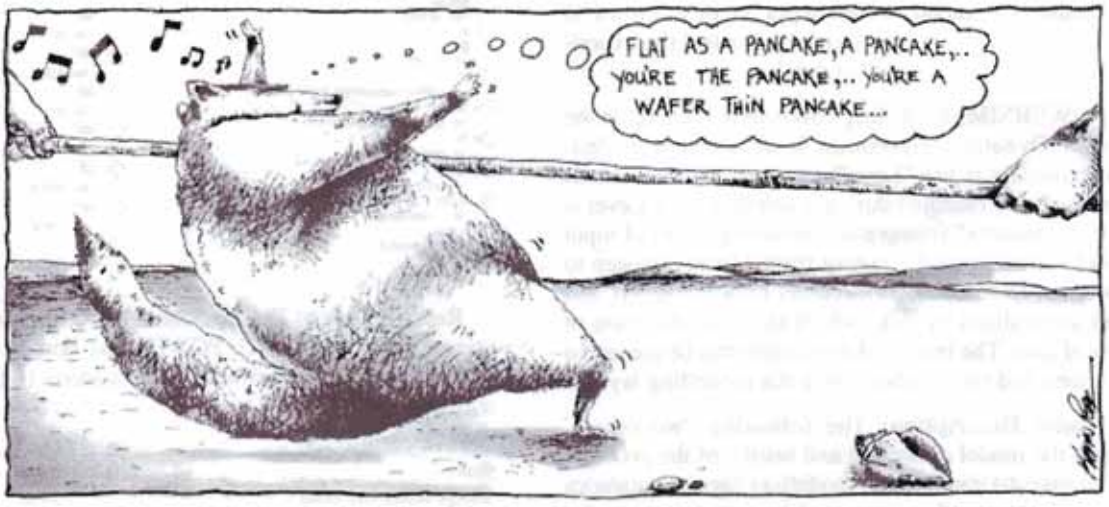


Task c) The calculation of steady states can only be done using long-term simulations. The following table shows the results at time t_1=500 and time t_2=1000, given in terms of the order of the error $O(10^p)$ for the solution f=r=m=0 in case of p_1=0 and given as absolute values for the solution f=m=10 and r=1000 in case of $p_2=10^4$.

State	p_1, t_1	p_1, t_2	p_2, t_1	p_2, t_2
f	$O(10^{-9})$	$O(10^{-18})$	9,9997	10,0
m	$O(10^{-9})$	$O(10^{-18})$	9,9046	9,9989
r	$O(10^{-9})$	$O(10^{-18})$	990,28	999,88

K. Scheidenberger, K. Schleiss, F. Breitenecker, Dept. Simulation Techniques, TU Vienna, Wiedner Hauptstraße 8-10, A-1040 Vienna, Austria.

THE WOLVERINE'S FLEXIBILITY CONTINUES TO AMAZE USERS



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Comparison 1 - IDAS / SIMPLORER

Description of IDAS

IDAS 3.01 for WINDOWS is a powerful software package mainly designed for the simulation of electronic circuits and control problems with a physical background.

Modelling may be carried out in three different ways:

- by dialog in WINDOWS-technique (easy and comfortable)
- textually in IDL (Idas Description Language)
- graphically with an additional program (e.g. ORCAD, PROTEL,...)

IDAS also provides a data analysis program called DAY, where the results can be evaluated mathematically and plotted in different ways.

Recently IDAS was extended and given the name SIMPLORER. SIMPLORER consists of

- a circuit simulator
- a signal flow graph simulator
- a state graph simulator

Some new features have been added, e.g.

- FUZZY - Control Module
- C-Programming interface
- Optimizer for automatic parameter-variation according to a predefined system behaviour
- Frequency response module etc.

The simulation was still carried out by IDAS on a Pentium 60mHz under Windows 3.11 for Workgroups.

Model description

For the simulation in IDAS a block diagram (signal flow, graph) of the given equations must be worked out. IDAS itself does not provide any possibility to show the block diagram graphically. The model was implemented by dialog in windows-technique.

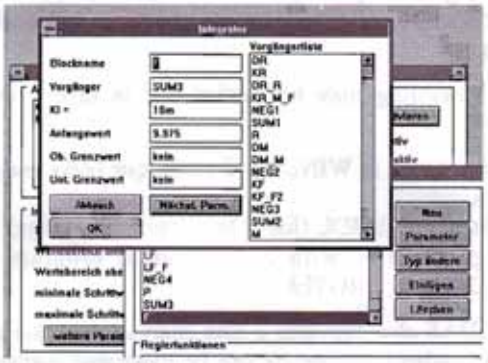
Results

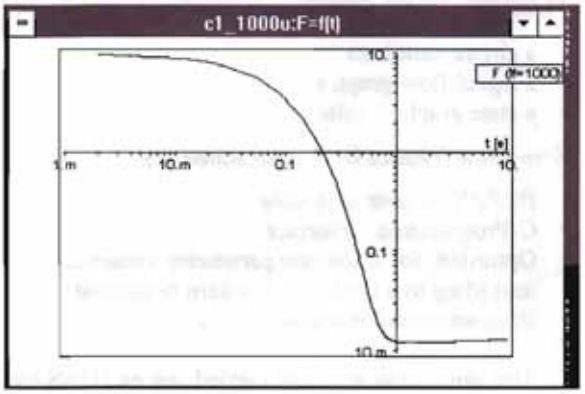
a)*Comparison of integration algorithms:*

IDAS provides two different algorithms: Euler and Trapezoidal. With a minimum step size of 0.002 and a maximum step size of 0.01 the results were nearly the same: The simulation run (including compilation and graphic output) needed approx. 8 seconds with both algorithms. Changing the step size did not show a significant influence on the output.

b)*Variation of parameter l_f:*

The system was simulated over 10 seconds with values of l_f equal to 100, 1000 and 5000 and plotted with the data analysis program DAY, with logarithmic scales as required. Unfortunately the results for l_f =10000 proved to be numerically unstable.





The last solution vectors (at t=10) were:

	r	m	f
l_f=100	84.327	2.1962	0.12481
l_f=1000	84.167	2.3069	1.2989E-2
l_f=5000	84.15	2.3184	1.3048E-3

c)*Calculation of steady states:*

As IDAS does not provide any instrument to calculate steady states the differential equations were solved in the interval $0 < t < 10000$ for p=0 and $0 < t < 30000$ for p=1E4. The last solution vectors were:

	r	m	f
p=0	4.9281E-3	5.4756E-4	1.5895E-5
p=1E4	937.51	9.4326	9.9983

Gerhard Stefan, TU Vienna, Dept. Simulation Techniques

Comparison 3 - IDAS / SIMPLORER

Description of IDAS

IDAS 3.01 for WINDOWS is a powerful software package mainly designed for the simulation of electronic circuits and control problems with a physical background.

Modelling may be carried out in three different ways:

- by dialog in WINDOWS-technique (easy and comfortable)
- textually in IDL (Idas Description Language)
- graphically with an additional program (e.g. ORCAD, PROTEL,...)

IDAS also provides a data analysis program called DAY, where the results can be evaluated mathematically and plotted in different ways.

Recently IDAS was extended and given the name SIMPLORER. SIMPLORER consists of

- a circuit simulator
- a signal flow graph simulator
- a state graph simulator

Some new features have been added, e.g.

- FUZZY - Control Module
- C-Programming interface
  Optimizer for automatic parameter-variation according to a predefined system behaviour
- Frequency response module, etc.

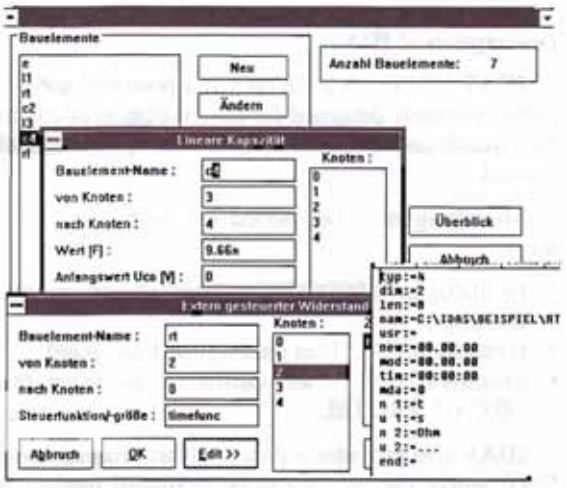
The simulation was still carried out by IDAS on a PENTIUM 60mHz under WINDOWS 3.11 for Workgroups.

Model description

It is easy to model the circuit, since no differential equation has to be entered or transferred into a block diagram. The elements are provided by the very powerful module *"Netzwerk"* ("electronic circuit") and simply need to be connected together. The graph of the time dependent resistor *R(t)* was entered in DAY.

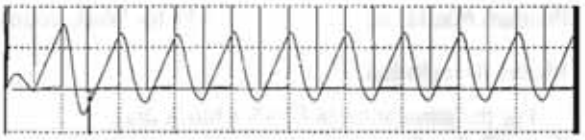
Results

a) *Calculation of the eigenvalues of the system:*
It is impossible in IDAS to solve question a) because IDAS has no eigenvalue routine incorporated.



b) *Simulation of the system:*
The electronic circuit is simulated over the time interval [0, 100E-6] with the parameter *TRF* equal to 1E-11, because unfortunately DAY cannot compute the number (5E-6 + 1E-15) - it would be rounded to 5E-6. The figures show the desired plots of the time curve of the state variables.

With a minimum step width of 1E-8 and a maximum step width of 5E-8 the simulation runs need approx. 15 seconds including compilation and graphic output.



c) *Parameter variation study:*

The resulting curves in the desired time interval [0, 9E-6] taking the final state of task b) at t=100E-6 as initial conditions give the following final states: x_1=0.26124, x_2=0.13582, x_3=3.8093E-2 and x_4=-12.891. For *TRF*=1E-7 the curves are different from the other two curves.

In the phase plot (dx_3/dt as a function of x_3) only the curve for *TRF*=1E-7 differs graphically from the other ones.

Gerhard Stefan, TU Vienna, Dept. Simulation Techniques

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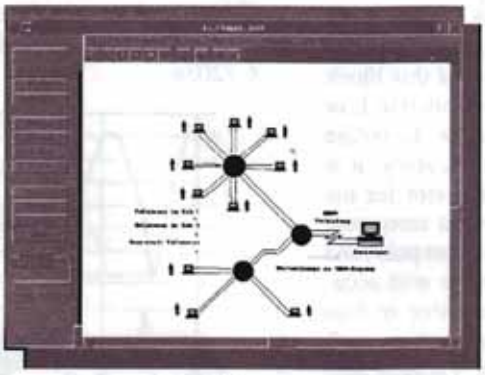

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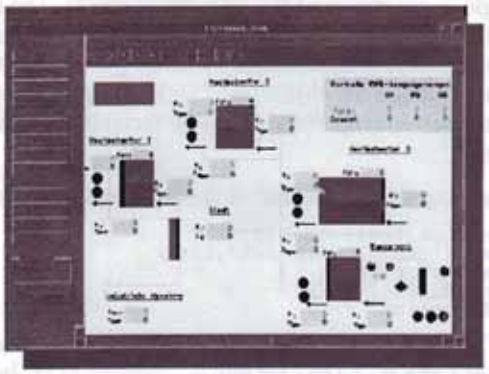
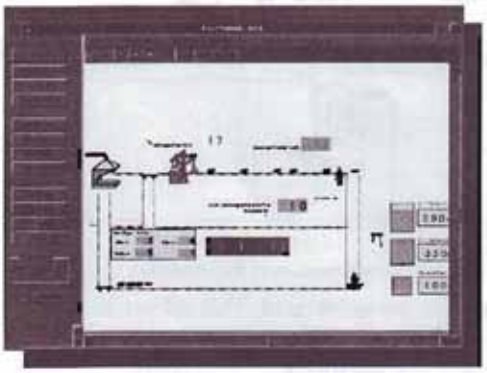




To obtain further information simply contact Wilfried Krug, Michael Schebesta
DUAL Zentrum GmbH, Gillestraße 2, 01219 Dresden, Tel.: +49 351 477910,
Fax: +49 351 477 9199 or
Systems Modeling Corporation, The Park Building, 504 Beaver Street, Sewickley, PA 15143, USA, Tel.: 412/741/3727; Fax 412/741/5635.

Comparison 7 - MATRIX$_X$ System-Build

Model Description:

SystemBuild is an interactive, graphical tool for building models of nonlinear systems. A special block is used to define state events: zero-crossing block. If the sign of the signal connected to the input of this block changes, the output of the block changes from 0 to 1, or from 1 to 0, depending of the previous state. To obtain the detection of the zero crossing with accuracy, it is necessary to choose a variable step integrator for the simulator. With such an algorithm, when a zero crossing is detected, the solver restart from the last point and decrease the step of integration to determine with accuracy the moment of crossing. The simulator is then reinitialised. Matrix$_X$ offers the choice of three such algorithms : Variable Step Kutta Merson, Variable Step Adams Moulton and a Differential Algebraic System Solver (DASSL) of L.R. Petzold. The signal generated by the zero crossing block is connected to a resettable integrator for state discontinuity, and to a data path switch block for parameter variations. The user can define the absolute and relative tolerances used by the variable step solvers and the tolerance used for the detection of discontinuities. The block diagram of the non linear model is presented in fig. 1.

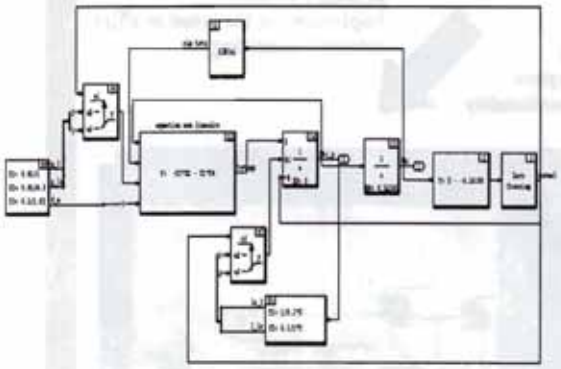


Figure 1: Representation of the Pendulum

The model is parameterized. This allows to realize easily the different simulations of the benchmark. This is performed using the following procedure :

```
m=1.02;l=1;ls=0.3;d=0.2;
phid=-pi/12;
param=[ls,d,m,l];
y=sim("pendule",t,{ialg=6,x0=[0,pi/6]});
```

The simulation of the linear model is performed by the suppression of the sinus block in the above figure. The user can choose to simulate both models in parallel or sequentially.

Results - Tasks a and b: Figure 2 presents the results of task b. The top curves represent the angle for both non-linear and linear models. The above one represents the velocity. Variable step Adams-Bashforth-Moulton solver has been used for this simulation. With the tolerance used by default (1.e-12 for zero crossing), discontinuities are detected at: 0.703459, 1.15178, 2.59042, 2.99053, 4.54274, 4.86749, 6.64871 and 6.72038.

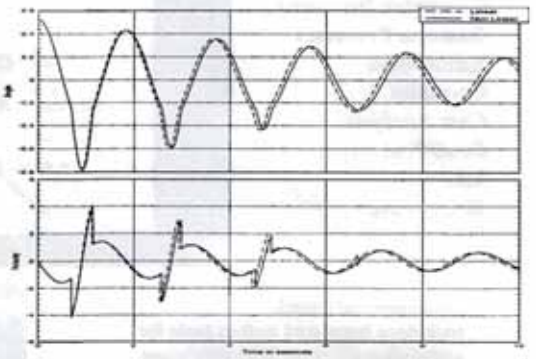


Figure 2: Simulation of the Pendulum

Task c: An optional optimisation module is available with Matrix$_X$. It is based on the Karmarkar algorithm. This module has been used to solve the third part of the benchmark. To perform an optimisation, the user has just to write a MathScript (program based on Xmath syntax) named *cost.msf* which evaluates the function to minimise. In this function for this application, at each iteration, a simulation is performed.

To minimise the simulation time, it is possible to add a stop condition block in the above block diagram. The stop condition is that the pendulum swings back (the angle is negative and the velocity positive). The minimum (maximum negative) reached angle is determined. The function to minimize is the absolute error between this angle and the objective (*-Pi/2*). This procedure has been used with the three available variable step integrators.

The program used to define the objective function is:

```
Function [out]=cost(p,it)
y=sim("pendule-non-lin",t);
m=min(y, channel );
out=abs(m(1)+pi/2);
EndFunction
```

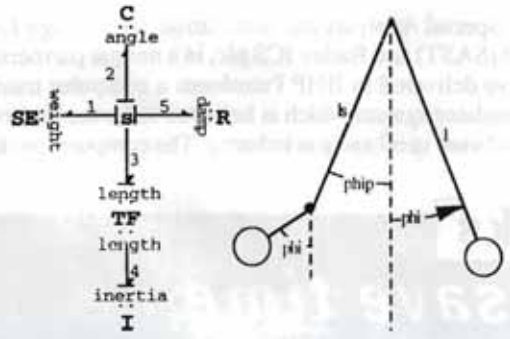
The solutions are found at 2.2910 for initial condition of 1 and at -2.1847 for initial condition of -1. In both cases, the error for the objective is of the order of 1.e-8. The differences between the results with the different solvers is of 2.e-5 and 1.e-8 with the default values of the tolerance.

A.Carriere, Dept Automatique, ESIEE, BP99, F-93162 Noisy Le Grand Cedex, France, email : carriere@esiee.fr ; S.Claquin, ISI France, 1 rue du Petit Robinson, F-78350 Jouy en Josas, France, email : sclaquin@isi.fr .

Comparison 7 - *Mathematica* Bond Graph Toolbox

Introduction: The Bond Graph Toolbox for *Mathematica* is a shareware which allows to edit and display bond graph models. It also generates symbolic equations that can be integrated directly in *Mathematica* or export to other simulation platforms. The *Mathematica* Bond Graph Toolbox (BondGraph.m) is available by the author (it's a $100 shareware).

The modeling approach is rather different from the one expected by the autor of the benchmark because the bond graph approach doesn't need to write directly the equations of dynamics. We just need to describe the bond graph model of the system (which is formally equivalent to these equations). The Bond Graph Toolbox automatically carries out the translation job.



Model: Bond graph models are usually discribed in at least two steps :

1) The structural dynamics definition which is the Bond Graph drawing. The toolbox accepts a text input form of the model :

```
pendulum = {SE:weight,Sf,{C:angle_},
{TF:{_length,length_},I:_inertia},R:damp_};
```

which is a modulated pendulum with damping. The C element is added to handle the pendulum angle, it doesn't affect the dynamic behaviour :

```
Draw[SetCausality[pendulum]]
```

2) and the constitutive laws of the elements :

```
laws={
weight->Sin[phi]*m*g*If[phi>phip,1,ls],
angle->(#*0&), (* No influence *)
inertia->Function[s,s/(m*l^2)],
length->Function[w,w*If[phi>phip,1,1/ls]],
damp->Function[w,d*w*If[phi>phip,l^2,ls^2]]
}/.phi->q[{2}][t];
```

This declares the constants and builds the state equations of the model :

```
m=1.02;g=9.81;l=1;ls=.3;
sys=Equations[pendulum] /. laws;
```

Results: Task a. i) Simulating the dynamics with the following parameters and conditions after initialisation:

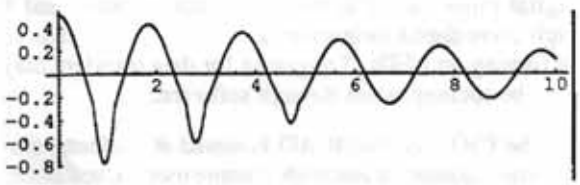
```
phi0=N[Pi]/6; d=.2; phip=-N[Pi]/12;

nsys=StateInit[sys,{phi0,0},0];
```

The dynamic model doesn't include any zero order discontinuties because the state variables (momentum and angle) of the pendulum are continuous over the time, so the motion may be solved in one go using *Mathematica* NDSolve function.

```
sol=NDSolve[nsys[[1]],nsys[[2]],{t,0,10}];
```

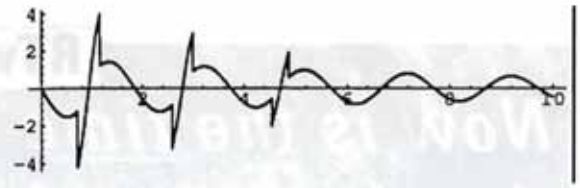
The motion is as follows:

```
Plot[Evaluate[q[{2}][t]/.sol],{t,0,10}]
```



And the velocity :

```
Plot[Evaluate[D[q[{2}][t]/.sol,t]],{t,0,10}]
```



Task a. ii) and **Task b)** are achieved by editing parameters and changing 'Sin' function to 'Identity' function whenever useful.

Task c) Find the initial velocity to exactly reach the angle phi=-Pi/2 at null velocity with the parameters :

```
phi0=N[Pi]/6; d=.2; phip=-N[Pi]/12;
nsys=StateInit[sys,{phi0,m*l^2*phidot},0];
```

This builds a function witch gives the minimum angle reached with an initial velocity 'wi' :

```
anglemin[wi_Real] := Module[{sol,f},
sol=NDSolve[ nsys[[1]] /. phidot->wi,
             nsys[[2]], {t,0,1}];
f=(q[{2}][t]/.sol)[[1]];
FindMinimum[f,{t,.5,0,1}] ]
```

Now find the initial velocity to reach exactly -Pi/2 :

```
FindRoot[anglemin[w0][[1]]==-N[Pi]/2,
        {w0,{-1,-2}}]
```

which gives the answer :

```
{w0 - -2.18452}
```

Nicolas Venuti, VIRTUAL DYNAMICS, 29 rue de Grand Vaux, F-91360 Epinay/Orge, France, e-mail: venutin@esiee.fr

$99 Analog-to-Digital Card

ComputerBoards introduces the lowest priced 8-channel analog-to-digital board on the market with the $99 CIO-DAS08/JR. Designed as an affordable 20 KHz A/D board, the CIO-DAS08/JR provides every popular I/O function. A $49 upgrade allows 2 channels of analog output to be installed.

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The CIO-DAS08/JR-AO is aimed at students, universities, hobbiests and high volume users. Used alone, it is low-cost / high volume solution for straightforward, low speed data acquisition applications. Its affordable price allows students and universities to own one for personal study or for classroom lab projects. Available for more in-depth data acquisition experiments is the CIO-LAB8TERM, an educational and training accessory board, which interfaces to the CIO-DAS08/JR-AO.

InstaCal software, shipped free with all ComputerBoards products, is a complete installation, calibration and test program. Programmers will want ComputerBoards Universal Library containing drivers for all Computer Boards Products at full speed for any language under DOS or Windows.

Contact: Vincent Hebert, Computer Boards Inc., Marketing Communications, 125 High Street, Mansfield, MA 02048, USA, Tel: +1-508-261-1123, Fax: +1-508-261-1094

First Direct Connect Operator Training Simulator

Special Analysis and Simulation Technology Limited (SAST) and Bailey ICS plc, in a unique partnership, have delivered to BHP Petroleum a computer training simulator system which is believed to be the first of its kind used in oil and gas industry. The computer package

International EUROSIM Conference
HPCN Challenges in telecomp and telecom:
parallel simulation of complex systems and large-scale applications
10 - 12 June 1996, Delft, The Netherlands

With this Newsletter the organizers would like to inform you on the latest developments.

Abstracts

The opportunity is still open to send your abstract to the Scientific Committee. The absolute deadline for sending your abstract is 15 July 1995. Notification of acceptance will be sent to you before 30 September 1995. The submission of your full paper has to be done before 15 January 1996. In case you have not received the First Announcement/Call for Papers, please contact Congress Office ASD for instructions in relation to the preparation of your abstract.

Book of Abstracts - Proceedings

During the conference a Book of Abstracts will be available. After the conference, approximately 3 to 4 months, the proceedings will be sent to you. The Proceedings of the conference will be published by Elsevier Science B.V.

Invited lecturers

The following topics will be covered: High Performance Computing (HPC) * High Performance Networking (HPN) * High Performance Measuring & Sensing (HPM). Invited lecturers are among others: Prof.Dr. C. Cap, Zürich, Switzerland, Prof.Dr. E. Shapiro, Standford, USA, Prof.Dr. T.E. Tezduyar, University of Minnesota, Minneapolis, USA, Dr. D.O. Williams, CERN, Geneva, Switzerland.

Exhibition

During the Conference at the Aula Conference Centre an exhibition will be organized, partly for commercial use, partly for scientific use. In case you are interested please contact Congress Office ASD.

Committee of Recommendation

The following authorities have given us the honour to participate in the Committee of Recommendation: Minister for Economic Affairs, The Netherlands, Dr. G.J. Wijers, Governor of the Province of Zuid-Holland, The Netherlands, Mrs.Ir. J.M. Leemhuis-Stout, Mayor City of Delft, The Netherlands, Mr. H.V. van Walsum, Chairman of the Executive Committee BSO Holding, The Netherlands, Mr. E.J. Wintzen, Rector Delft University of Technology, The Netherlands, Prof.Dr. K.F. Wakker, Secretary General of CRE (The Association of European Universities, Switzerland), Dr. A. Barblan Vice President École Polytechnique Fédérale de Lausanne, Switzerland, Prof. D. de Werra Scientific Committee

The Scientific Committee has been extended with: W. Ameling, Technische Hochschule Aachen, Germany, J.C. Arnbak, Delft University of Technology, The Netherlands, E. Backer, Delft University of Technology, The Netherlands, Th. Coupez, École des Mines de Paris, France, P. van Hove, European Commission, Belgium, G. Iazeolla, University of Roma II, Italy, K. Juslin, Technical Research Centre of Finland, Finland, K. Madsen, University of Denmark, Denmark, J. Reeve, University of Southampton, United Kingdom, A. Schiper, École Polytechnique de Lausanne, Switzerland, I.N. Sinitsyn, Academy of Science, Russia, H.A.G. Wijshoff, University of Leiden, The Netherlands, D.O. Williams, CERN, Switzerland, P.J. Zandbergen, Twente University, The Netherlands.

Co-operating Institutions

The following Universities have already promised to support the conference: University of Amsterdam, The Netherlands Technical University Eindhoven, The Netherlands University of Leiden, The Netherlands University of Nijmegen, The Netherlands University of Twente, The Netherlands Technical University of Denmark, Denmark ETH Zürich, Switzerland École Nationale Supérieure des Mines de Paris, France

Final Announcement

The Final Announcement, registration forms and detailed information on the Scientific Programme, registration fee and hotel reservation will be distributed in January 1996. If you wish to receive this brochure, please contact the Congress Office ASD. We do hope that this information will contribute to encourage you to send an abstract and/or to participate in our conference.

Conference On-line Information

World wide web:
<URL:http://www.twi.tudelft.nl/Conferences/EUROSIM/index.html>
<URL:http://eurosim.tuwien.ac.at/>

Information and Corespondence

Congress Office ASD
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Telephone: +31 15 120234
after 10 October 1995: +31 15 2120234
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after 10 October 1995: +31 15 2120250
E-mail: HPCN-Eurosim@TUDelft.nl

replicates completely the control system interface of BHPs new Point of Ayr gas terminal in North Wales which is due to come on stream at the end of 1995 - and already the system has simulated piping first gas to its customer, PowerGen.

Part of BHPs integrated Liverpool Bay developement, the gas terminal is designed to handle 300 million standard cubic feet of gas per day and will remove sulphur before transmission by pipeline to PowerGents new power station at Connahs Quay.

Realisations of the concept necessitated the joint of SAST and Bailey. SAST provided the high fidelity models with its proprietary Dynamic Simulation Software environment (OTISS) and the Instructor, Operators and Engineers interface through ist proprietary Man Machine Interface (XENG) together with the project management aspect of the package. Bailey has contributed the latest technology in distributed control systems and USM packages.

Apart from ist value as a training tool, BHP expects the new system to be useful for trouble-shooting and also for monitoring the competency and performance of the gas terminal's operations team.

Contact: SAST Ltd., Waterway House, The Ham, Brentford, Middlesex TW8 8HQ, UK, Tel: +44-181 847 0565, Fax: +44-181 847 4698.

New Factory Simulation Software Enables Better Modeling of Semiconductor Wafer Fabrication Facilities

Systems Modeling Corporation announced the release of version 2.0 of the Wafer Fabrication Template for Arena (WFT), factory simulation software. This new release features extensive enhancements to the product's existing simulation tools while adding new, state-of-the-art features.

The software's new features include: conditional and probabilistic branching logic, allowing for true decision logic definition; a new reports module, so users can create their own custom reports; scrap and rework probability definition; and hot lot definition tools that allow for enhanced lot prioritizing. This added functionality allows users to easily and accurately represent common production methods of today's wafer fabrication facilities in the simulation model.

The Wafer Fabrication Template was originally created two years ago in a joint development project between Systems Modeling Corporation and SEMATECH. That project focused on creating a leading edge simulation tool that met the unique requirements of the SEMATECH member companies. Since the initial release, Systems Modeling actively worked with its customers to identify the next series of enhancements for the WFT; their input is reflected in this new version of the software.

Systems Modeling Corporation creates and supports innovative computer software dedicated to simulation. With its widely used products, Arena and SIMAN/Cinema, Systems Modeling has earned a reputation as a leader in simulation technology. Founded in 1982, we have installed more than 5,000 systems at organizations throughout the world.

Contact: Caroline Collins Zenkevich, Systems Modeling Corporation, Tel: +1-412 7411-3727, E-Mail: caroline@mail.sm.com

AutoSimulations Offers Free Scheduling Brochure

AutoSimulations offers a free scheduling brochure to manufacturers describing important issues relevant to scheduling technologies. Titled "Answers to the Five Most Important Scheduling Questions" the brochure addresses the following frequently asked cheduling questions:

How can I accurately determine the capacity of my facility?
What is a good schedule?
What task should be selected next?
When should I launch orders into the facility?
What finite capacity scheduling technologies are available and what are their strengths and weaknesses?

The brochure also introduces simulation-based finite capacity planning and scheduling software as the solution to scheduling dynamic product mix and flow. In addition, graphs and decision trees featured throughout the brochure further illustrate the schedulig concepts discussed.

Contact: Karen Stanley, AutoSimulations, Tel: +1-801-298 1398 ext. 300.

A Matlab Toolbox for Hidden Markov Models

Hidden Markov models (HMM) have been widely applied in Automatic Speech recognition. In this field signals are encoded as temporal variation of short time power spectrum [1]. HMM applications are now being extended to many fields such as pattern recognition, signal processing and control.

They are well suited for the classification of one or two dimensional signals. They extract reliable information from sequences of observations and integrate local information for detection into global information on the concatenated sequence. An HMM is a double stochastic process with one underlying process that is not observable but may be estimated through a set of processes that produce a sequence of observations. They may be used for the treatment of problems where information is uncertain and incomplete. Their use necessitates two stages: a training stage where the stochastic process is estimated through extensive observation and an application stage where the model may be used in real-time to obtain sequences of maximum probability.

HMM models owe their success to the existence of many algorithms which are efficient and reliable. For the training stage the Baum-Welsh algorithm [2] has become very popular due to its reliability and efficiency. This algorithm has since been extended to include many different probability distribution functions and proofs of convergence are now available for these models. This method is based on the maximum likelihood criterion. Many works are now available on algorithms accounting for this and other criteria [3,4,5]. Due to the non-convexity of the criterion, methods such as the simulated annealing are now used [6,7]. The use of the trained HMM in real-time necessitates the use of an efficient algorithm which gives the state sequence of maximum probability. The Viterbi algorithm [8] fulfills this need. This algorithm is a polynomial time dynamic programming algorithm. It is very efficient and very reliable and robust.

In order to use the HMM techniques, the authors use the Matlab environment. They have written many of the

algorithms using Matlab script. These algorithms are in the form of Matlab functions. This environment now includes the following algorithms.

1. **State Estimation by the Viterbi Algorithm:** The functions available cater for both discrete and continuous observations. Continuous probability distribution functions are either simple gaussian or a mixture of gaussians. The user may also replace the gaussian function by simply writing his own Matlab probability distribution function. A modified Viterbi algorithm is also included to account for explicit time correlation between observations.

2. **Training Algorithms:** The following training schemes are included

- *Baum-Welch and Liporace Algorithms*: The functions available cater for both discrete and continuous observations [2,3]. Continuous probability distribution functions are either simple gaussian or a mixture of gaussians as well as autoregressive models. A modified Baum-Welch algorithm is also included to account for explicit time correlation between observations.
- *Training based on the Viterbi Algorithm:* Functions for both continuous and discrete observations are available based on the reestimation with an embedded Viterbi algorithm. The matrices are estimated to maximize the probability of the sequence obtained by the embedded Viterbi algorithm.
- *Simulated Annealing*: The authors have developed a simulated annealing method for the training of HMM [7]. This algorithm based on the generation of an optimal state sequence is available. The user may either fix the structure of the stochastic matrices or keep them free. The user does not need to make decisions such as initial or final temperature and chain length. He may, however, select the initial rate of acceptance of the algorithm at high temperatures.
- *Optimization Based Training*: This algorithm is based on the optimization of the chosen criterion using the gradient projection method.
- *Discriminative optimization Based Training*: The network based systems are trained to discriminate between classes, whereas HMMs are normally trained to provide a within class maximum likelihood estimate. The user may choose a discriminative optimization criterion such as maximum mutual or minimum discrimination information [4,5]. Other methods are also included.

3. **Clustering:** To start working on an HMM it is sometimes necessary to use clustering scheme A simulating annealing algorithm is also available [9] for grouping observations into a prefixed number of clusters according to the minimum distance criterion. The K-segmentation method for example necessitated the use of such schemes.

4. **Vector quantization:** Classical algorithms for vector quantization are available. A simulated annealing scheme developed by the authors is also included

5. **Various functions:** Functions for manipulation the HMM are also available. These functions cover manipulating sequences of observations and states, calculating probabilities and maximum likelihoods and other elements needed for the writing of customized algorithms. In many cases a need for the generation of test sequences arise. Functions for generating test sequences for both continuous and discrete observations are available.

Conclusions:

In this paper a brief description of the elements of an HMM toolbox for Matlab is presented. This toolbox is now being tested on many different problems for robustness and reliability. The toolbox is structured so that the user may extend by adding new functions using basic elements. Many methods for HMM are available and the authors are working on the extension of the toolbox to cover for some of them.

References

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Calendar of Events

July 1995

11-13 **LSS'95**. 7th IFAC/IFORS/IMACS Symposium on Large Scale Systems: Theory and Applications. London, U.K.
Contact: LSS'95 Secretariat, Control Engineering Centre, City University, Northampton Square, London EC1V 0HB, Tel: +44-71 477 8133, Fax: +44-71 477 8568, Email: lss95@city.ac.uk.

23-27 1995 **Summer Simulation Conference**. Ottawa, Canada.
Contact: SCS, P.O. Box 17900, San Diego, CA 92177, Tel: +1-619-277 3888, Fax: +1-619-277 3930, Email: scs@sdsc.bitnet

August 1995

14-18 **CACI International Simulation Conference**.
Washington DC, USA.
Contact: Tony Whitehouse, CACI Products Division, Coliseum Business Centre, Watchmoor Park, Riverside Way, Camberley, Surrey GU15 3YL, U.K. Tel: +44-1276 671671, Fax: +44-1276 670677

21-23 **EANN 95**. International Conference on Engineering Applications of Neural Networks. Helsinki, Finland
Contact: EANN 95/SEA, Post box 34, FIN-20111 Turku 11, Finland, Email: eann95@aton.abo.fi

21-25 **14. Congres International de Cybernetique**. Namur, Belgium
Contact: International Association for Cybernetics, Palais des Expositions, av. Sergent Vrithoff 2, B-5000 Namur, Belgium, Tel: +32-81 735209, Fax: +32-81 742945, Email: Cyb@info.fundp.ac.be

28-30 **IMACS European Simulation Meeting on Simulation Tools and Applications**. Gyor, Hungary
Contact: A. Jávor, KFKI Research Institute for Measurement and Computing Techniques, H-1525 Budapest, P.O.Box 49, Hungary, Tel: +36-1 1699499, Fax: +36-1 169553, E-mail: javor@snserv.kfki.hu

September 1995

10-15 **Summer Course on Pharmacokinetics**. Varese, Italy.
Contact: Scuola di Modelli Matematici in Biologia e Medicina, c/o Università di Varese, Facoltà di Scienze, Via Ravasi 2, I-21100 Varese, Italy. Fax: +39-332-281308, E-mail: mapiro@imiucca.csi.unimi.it

11-13 **TECHNOMAN**, Bruges, Belgium.
Contact: Philippe Geril, SCS, European Simulation Office, University of Ghent, Coupure Links 653, B-9000 Ghent, Belgium. Tel: +32.9.233.77.90, fax: +32.9.223.49.41, E-mail: Philippe.Geril@rug.ac.be

11-15 **EUROSIM '95 European Simulation Congress**. Vienna, Austria
Contact: EUROSIM95, Computing Services, Technical University of Vienna, Wiedner Hauptstr. 8-10, A-1040 Vienna, Austria. Tel: +43-1 58801 5386, 5484, 5374 Fax: +43-1 5874211, E-mail: eurosim95@email.tuwien.ac.at

12-15 XII. International Conference on **Systems Science**.
Wroclaw, Poland.
Cotact: Prof. Jerzy Swiatek, Technical University of Wroclaw, Inst. of Control and Systems Engineering, Wybrzeze Wyspianskiego 27, PL-50-370 Wroclaw, Poland, Tel: +48-71 216226, Fax: +48-71 223664, Email: I17@PLWRTU11.BITNET.

21-22 ***„Simulation und Simulatoren für den Schienenverkehr"***.
München, Germany.
Contact: VDI-Gesellschaft für Fahrzeug- und Verkehrstechnik, Postfach 10 11 39, D-40002 Düsseldorf, Tel: +49-211 6214 264 or 523, Fax: +49-211 6214 163

25-27 Electrotechnical and Computer Science Conference **ERK'95**, Portoroz, Slovenia
Contact: Baldomir Zajc, University of Ljubljana, Faculty of Electrical and Computer Engineering, Trzaska 25, 61000 Ljubljana, Slovenia, Tel: +386 61 1768 349, Fax: +386 61 264 990, Email: baldomir.zajc@fer.uni-lj.si

25-27 **SAMO 95.** Theory and applications of Sensitivity Analysis of Model Output in computer simulation. Beligrate, Italy
Contact: A. Saltelli, T.P. 321, JRC -El, Ispra Site, I-21020 Ispra, Italy, Tel: +39-332 789696, Fax: +39-332 785466

October 1995

10-12 **DDP '96**. 5th International Workshop on Distributed Data Processing. Novosibirsk, Siberia. Russia.
Contact: Prof.V. Khoroshevsky, Fax: +7-3832 357502, Email: Khor@isph.nsk.su

16-20 **BICSC'95**. 3rd Beijing International Conference on System Simulation and Scientific Computing. Beijing, China.
Contact: Prof. Zhang, Minglian, CASS, 37, Xueyuan LU, Beijing 100083, P.R. China, Tel: +86-1 2026677 4471, Fax: +86-1 2015347

23-24 ASIM Workshop ***"Simulationsmethoden und -sprachen für verteilte Systeme und parallele Prozesse"***. Dresden, Germany.
Contact: Peter Schwarz, Fraunhofer-Institut IIS/EAS, Zeunerstraße 38, D-01069 Dresden, Tel: +49-351 4640 730, Fax: +49-351 4640 703, Email:schwarz@eas.iis.fhg.de

26-28 **7th European Simulation Symposium ESS 95.** Erlangen - Nuremberg, Germany.
Contact: Philippe Geril, SCS, European Simulation Office, University of Ghent, Coupure Links 653, B-9000 Ghent, Belgium. Tel: +32.9.233.77.90, fax: +32.9.223.49.41, E-mail: Philippe.Geril@rug.ac.be,WWW : <URL:http://faui30t.informatik.uni-erlangen.de:1200/Misc/ESS95.html>

30-November 1
Making it REAL. CEAS Symposium on Simulation Technologies. Delft, The Netherlands.
Contact: Mrs. A. Bredt, P.O. Box 90502, 1006 BM Amsterdam, The Netherlands, Tel: +31-20 511 3651, Fax: +31-20 511 3210, Email: asbr@rdr.nl

November 1995

29-December 1
IFAC meeting **International Workshop on Artificial Intelligence in Real-time Control.** Bled, Slovenia.
Contact: AIRTC 1995, Dr. Jus Kocijan, Faculty of Electrical and Computer Engineering, Trzaska 25, 61000 Ljubljana, Slovenia, Tel.: + 386 61 1768 417, Fax: + 386 61 264 991, E-mail: jus.kocijan@fer.uni-lj.si

December 1995

1 Meeting of the ASIM working group ***"Simulation von Verkehrssystemen"***. Dortmund, Germany
Contact: Karl-Heinz Münch, SIEMENS AG, Bereich VT2 SYS, Ackerstraße 22, D-38126 Braunschweig, Tel: +49-531 226 2225, Fax: +49-531 226 4305

3-6 **1995 Winter Simulation Conference**. Arlington, VA, USA.
Contact: William R. Lilegdon, Pritsker Corp., 8910 Purdue Rad, Suite 500, Indianapolis, IN 46268, SA,Tel: +1-317-471 6530, Fax: +1-317-471 6525, Email: wrli-legdon@aol.com

January 1996

3-6 **29th Hawaii International Conference on System Scences**. Maui, Hawaii
Contact: Alois Ferscha, Universität Wien, Inst. f. Angewandte Informatik, Lenaugasse 2/8, A1080 Vienna, Austria, Tel: +43-1-408636618, Fax: +43-1-4080450

14-17 **Mission Earth '96**. Modeling and Simulation for a Sustainable Global System. La Jolla, California.
Contact: Wayne C. Jouse, University of Arizona, Dep. of Nuclear and Energy Engineering, Tucson, Arizona 85721, Tel: +1-520-621 2401, Fax: +1-520-621 8096, Email: Jouse@Aruba.CCIT.Arizona.Edu

April 1996

18-20 ***7. Ebernburger Gespräche***. ASIM Wokshop. Ebernburg, Germany
Contact: Prof. Dr. Otto Richter, TU Braunschweig, Institut für Geographie und Geoökologie, Langer Kamp 19c, 38106 Braunschweig, Tel: +49-531 391 5627 Fax: +49-531 391 8170.

June 1996

10-12 **HPCN challenges in telecomp and telecom**: parallel simulation of complex systems and large-scale applications. The Netherlands.
Contact: Congress Office ASD, P.O. Box 40, 2600 AA Delft, The Netherlands, Tel: +31-15 120234, Fax: +31-15 120250.

July 1996

1-5 **9th International Conference on Mechanics in Medicine and Biology ICMMB '96**. Ljubljana, Slovenia.
Contact: A. Kregar, Cankarjev dom, Cultural and Congress Centre, Presernova 10, 61000 Ljubljana, Slovenia, Tel: +386-61 1767 133, Fax: +386-61 217 431.

September 1996

16-19 ***ASIM 96, 10. Symposium Simulationstechnik***, Dresden, Germany.
Contact: Michael Schebesta, DUAL-ZENTRUM Dresden, Gillesstraße 2, D-01219 Dresden.

February 1997

2nd IMACS Symposium on Mathematical Modelling. Vienna, Austria.
Contact: Prof. I. Troch, TU Vienna, Wiedner Hauptsr. 8-10, A-1040 Vienna, Austria

Summer 1997

IMACS World Congress Berlin

April 1998

EUROSIM '98 European Simulation Congress. Finland

Classes on Simulation

July 1995

4-5 ***SIMULINK-Kurs***. München.
Contact: BAUSCH-GALL GmbH, Wohlfartstr. 21b, D-80939 München, Germany, Tel: +49-89 3232625, Fax: +49-89 3231063

September 1995

4-8 **Modsim & Simobject**, CACI Training Course, Camberley, U.K.
Contact: CACI Products Division, Coliseum Business Centre, Watchmoor Park, Riverside Way, Camberley, Surrey GU15 3YL, U.K. Tel: +44-1276 671671, Fax: +44-1276 670677

7-8 **COMETT Course: Simulation and Automatization**. Vienna, Austria.
Contact: Prof. Dr. F. Breitenecker, Dept.Simulation Technique, TU Vienna, Wiedner Haupstraße 8-10, A-1040 Vienna Tel. +43-1-58801-5374, Fax: +43-1-5874211

13-15 **COMNET III**, CACI Training Course, Camberley, U.K.
Contact: CACI Products Division (see above)

13-15 **Micro Saint Training 1995. Healthcare Simulation**. Manchester, England.
Contact: Rapid Data Ltd., Crescent House, Crescent Road, Worthing, West Sussex BN11 5RW, UK, Tel: +44-1903 821266, Fax +44-1903 820762

20-22 **Simulation with Micro Saint**. Stafford, England.
Contact: Rapid Data Ltd., Crescent House, Crescent Road, Worthing, West Sussex BN11 5RW, UK, Tel: +44-1903 821266, Fax +44-1903 820762

20-22 **Simscript II.5**, CACI Training Course, Camberley, U.K.
Contact: CACI Products Division (see above)

25-27 **COMNET III**, CACI Training Course, Camberley, U.K.
Contact: CACI Products Division (see above)

26-27 ***MATLAB-Kurs***. München.
Contact: BAUSCH-GALL GmbH, Wohlfartstr. 21b, D-80939 München, Germany, Tel: +49-89 3232625, Fax: +49-89 3231063

October 1995

10-11 ***Simulation mit SPICE***. München.
Contact: BAUSCH-GALL GmbH, Wohlfartstr. 21b, D-80939 München, Germany, Tel: +49-89 3232625, Fax: +49-89 3231063

24-25 ***SIMULINK-Kurs***. München.
Contact: BAUSCH-GALL GmbH, Wohlfartstr. 21b, D-80939 München, Germany, Tel: +49-89 3232625, Fax: +49-89 3231063

November 1995

7-8 ***ACSL-Kurs***. München.
Contact: BAUSCH-GALL GmbH, Wohlfartstr. 21b, D-80939 München, Germany, Tel: +49-89 3232625, Fax: +49-89 3231063

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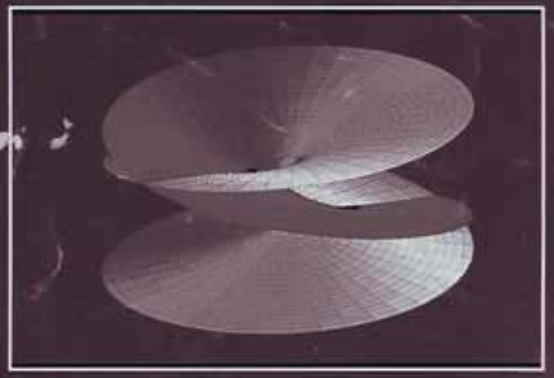

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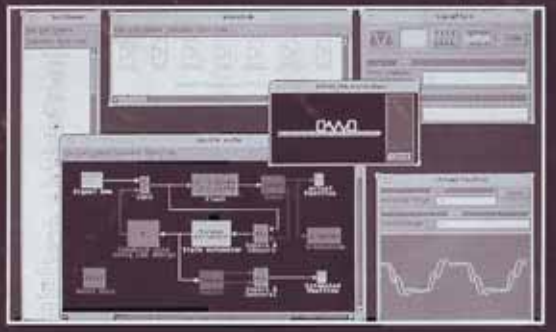

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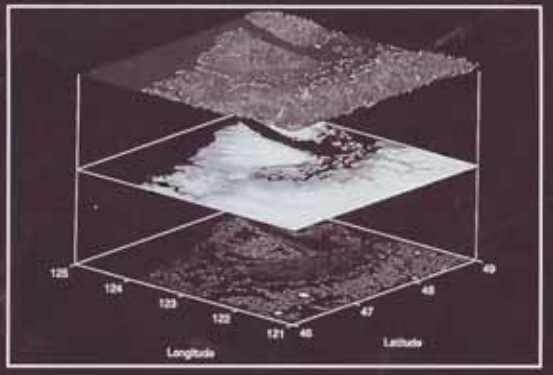

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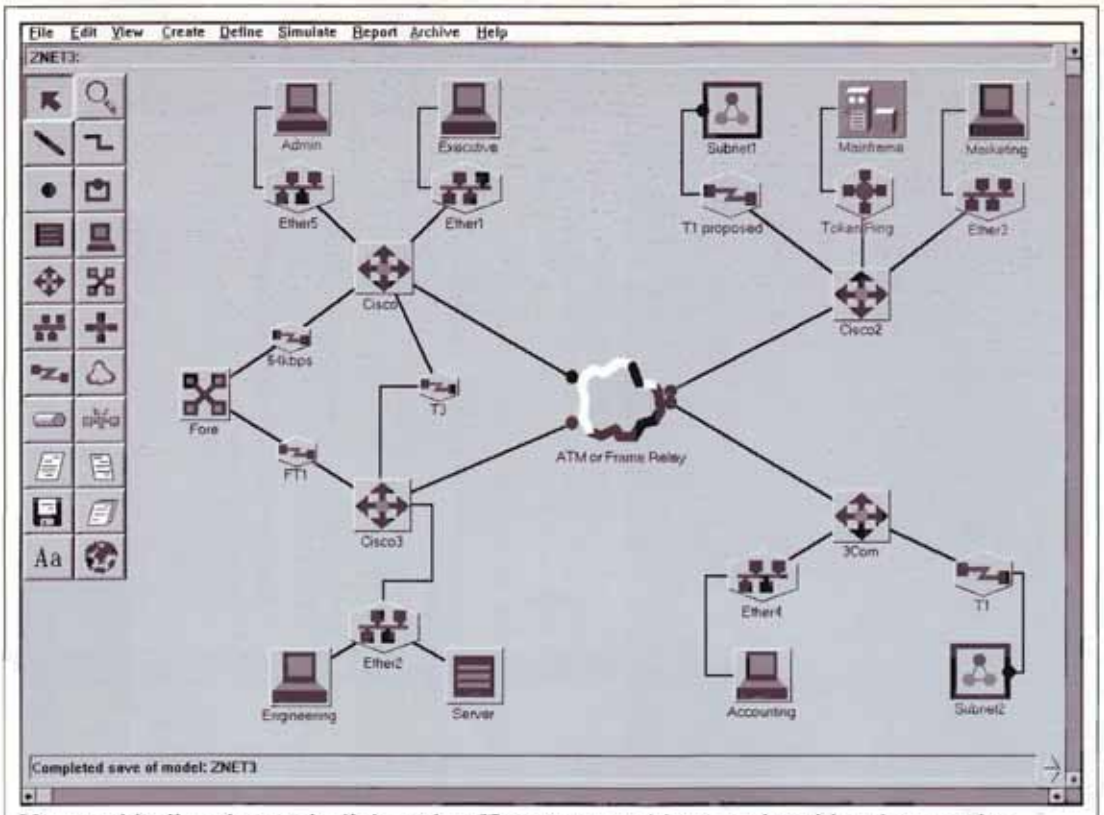

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