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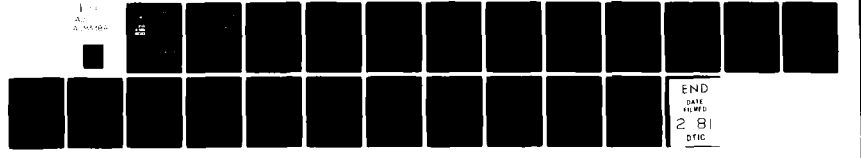

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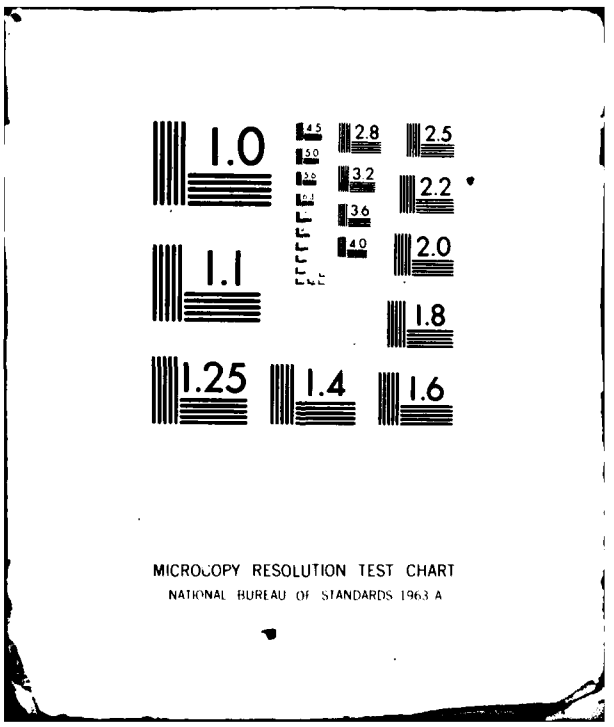
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OFFICE OF NAVAL RESEARCH

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SIMULATION '80 SYMPOSIUM

Richard E. Nance*

21 November 1980

*Department of Management Science, Imperial College of Science and Technology, London, UK

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Computer aided modeling	Methodology
Distributed systems	Software
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report of the Simulation '80 Conference held in Interlaken, Switzerland on 25-27 June 1980, focuses on the methodological and technological sessions. The report is divided into four topical areas: (1) methodological issues, (2) computing hardware, (3) computing software, and (4) simulation applications. A concluding summary draws a brief comparison between the current research interests in Europe and the US.

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SIMULATION '80 SYMPOSIUM

"Simulation '80", which was held on 25-27 June in Interlaken, Switzerland, was the third symposium on simulation to be organized by the International Association of Science and Technology for Development (IASTED). The earlier meetings sponsored by IASTED were also held in Switzerland, in 1975 and 1977.

Only three copies of preprints were available for examination during the "Simulation '80" symposium. Conference papers are to be subjected to a second review; selected papers will form the first two issues of the *International Journal on Simulation*, to be published by IASTED later this year.

As the Appendix indicates, the Simulation '80 Symposium was preceded by a course during which invited presentations of both a tutorial and a state-of-the-art nature were given. Presenters from the course often served as session chairmen during the symposium.

Although it was divided into three parallel tracks—modeling methodology, technical applications, and non-technical applications—the symposium followed a rigid scheduling format that permitted attendees to hear individual presentations in different sessions. The program in the appendix is marked with vertical parallel lines to show the presentations attended by the author. As is evident from the marked presentations, the author's interest centers on methodological and technological topics, which are the focus of this report. This emphasis and the objective of providing an integrative summary stimulate a format quite different from the program division for the symposium; the report format addresses simulation from the perspective of methodological issues, computing hardware, computing software, and simulation applications. Two of these sections (methodological issues and computing software) are divided into subsections, one dealing with discrete event simulation (the recognition of states assumed by the model at particular points in time) and a second with continuous simulation (viewing the model as a continuous succession of states permitting no discontinuities). The report concludes with a summary that draws some comparison between the current research interests in Europe and the US.

Methodological Issues

The "Modeling Methodology" track was allotted the largest lecture hall and seemed to attract the most attendees except when presentations were made in languages other than English.

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The plenary presentation by T.I. Ören attracted much attention and raised some controversy. Ören emphasized the modeling tools that, while available in some research locations now, would be needed to construct, test, evaluate, and use the complex models of tomorrow. He characterized the progression in computer aided modeling systems (CAMS) as proceeding from mechanization through automation and eventually to "cybernation". Major areas of potential computer support were identified as: (1) model generation and referencing, (2) model acceptability (verification and validation), (3) model processing, and (4) behavior processing (permitting the analysis of model results to extend from points to trajectories and to structures). Ören's presentation made no differentiation between the discrete-event and continuous-modeling domains, and the few examples he gave included both model types.

M.B. Carver raised a controversial question as to how this characterization of CAMS really assisted in solving problems. Was it a practical, usable methodology? Ören's response was somewhat defensive, and both the question and the answer seemed to generate supporting reactions from the audience.

Discrete Event Simulation

The session on program generators was cancelled, and this left a large gap in the treatment of discrete event methodology. The session on statistical aspects of simulation was scheduled at the same time as the meeting of the International Association for Mathematics and Computers in Simulation (IMACS) Technical Committee 3 (TC3) on Simulation Software, and the latter was attended by the author. However, a brief review of the preprint by P. Heidelburger and P.D. Welch for their presentation, "A Spectral Method for Placing Confidence Limits on Simulations Steady State Characteristics" suggested that this paper should be read by those working on the statistical analysis of simulation output. The results posted by R.T. Stroup in his investigation of an autogressive model for setting confidence limits should be compared with the recent work of A.M. Law (Univ. of Wisconsin, Madison).

The session on simulation software, particularly the critical assessment of languages presentation by B. Schmidt, provoked much audience reaction. Schmidt classified languages for simulation modeling (SLs: Simulation Languages) into the following classes:

(1) High level programming languages (PASCAL).
(2) Low level simulators (GASP).
(3) High level simulators (GPSS).
(4) Special purpose simulators (ECSS).
(5) Parameter driven simulators.

(This classification can be defended from a user's point of view, but it would not be acceptable to researchers in simulation programming languages.) After comparing and contrasting the classes of SLs, Schmidt initially predicted that only the high-level simulators (his examples were SLAM, COSY, SIMON, and GPSS-FORTRAN) would survive as tools. Later, however, in response to a question, he stated that parameter-driven simulators would also survive.

Continuous Simulation

Bond graphs appeared to be a dominant topic in continuous simulation. This descriptive technique, perhaps ten years old but with a published life of much less than that, received much attention. The presentation by P.C. Breedveld, in which he extended the bond-graph concept to accommodate systems with kinetic and elastic energy, was impressive. His approach was clear and simple, and he retained the natural structure of bond graphs, a fact applauded by one questioner.

The session on distributed systems simulation appeared to be concerned with distributed, as opposed to lumped, parameter systems M. Köhne's presentation centered on the simulation of a system in which proper feedback mechanism must be selected so that the system state can follow that of a reference model.

A basic requirement for continuous models based on differential equations is a matrix solution solver (linear system or nonlinear). The papers of E. Eitelberg and M.B. Carver addressed this requirement from quite different perspectives. The latter described the necessity for distinguishing between least squares fitting for a single function (derivative guiding) and for multiple functions (Jacobian). Eitelberg demonstrated the utility of program structure and proper design in developing software for solving large state-space systems.

Although the applicability of sparse matrix techniques was apparent in several methodological and application presentations, only Eitelberg explicitly recognized their utility. This should be a major source of efficiency for the models requiring large systems of differential equations.

Computing Hardware

The influence of hardware technology on simulation seemed to be only beginning to surface at the symposium. THTSIM, described by J.W. Meerman, refers to a dedicated bond graph modeling system using the lower members of the PDP-11 family. Meerman's justification—lower cost, needed control, and a "hands-on" ability—will be repeated often in the near future.

The session on simulation hardware featured presentations on both multiprocessor and parallel processing systems. Because of his flight schedule the author was not able to attend either presentation. The presentation on designing distribution systems by simulation took place at the same time as the TC3 meeting noted above, which the author attended. However, the preprint for this presentation suggested that a close reading would be advisable.

Although simulation represents a natural usage environment for hybrid computers, general interest in such systems seems to be waning as compared with that evidenced in past conferences in the US. Only three paper titles identified the use of a hybrid system.

Computing Software

The influence of emerging knowledge in software development technology could be perceived as very uneven in its effects on both discrete event simulation and continuous simulation.

Discrete Event Simulation

Discrete event simulation has served as a leading edge in software development, e.g., the class concept and process interaction capability of SIMULA 67, the descriptive discourse and modularity provided by SIMSCRIPT II, and the high-level modeling tools provided by such program generators as DRAFT and CAPS. However, the cancellation of the session on program generators and the paper on natural language oriented modeling by H. Charapry, et al., left a major gap. GPSS-FORTRAN was described by B. Gernoth as a Fortran implementation of the major GPSS blocks, but the utility of the macro-level description for model development, B. Schmidt's opinion notwithstanding, remains to be demonstrated.

Continuous Simulation

The advantages of modularity and the structured design philosophy were evident in the presentations of Eitelberg and Carver (both already mentioned). The latter recognized that modularity also promotes adaptability in the routines and techniques employed to solve a specific problem. Meerman's presentation of THISIM also reflected good structured design of the software/hardware interface by the partitioning of the expandable elements to permit upgrading of the PDP-11 system.

Simulation Applications

As was mentioned earlier, one of the author's primary interest was the methodology track, and consequently, he attended only those applications presentations which were not scheduled in conflict with

meaningful methodological presentations and which had the potential to contribute insights on methodological issues. The presentation by E.A. Silver offered such insights in its demonstrated use of analytical and modeling arguments to reduce the simulation experiment to a conditional Monte Carlo model. The model solution was obtained more efficiently by this simplification. The presentation by M.A. Geisler involved work that was several years old.

W. Bruggeman described an investigation of heuristic decisions with "pure" inventory models (no production considerations). One of Bruggeman's major conclusions was that forecasting techniques that rely on dynamic demand predictability and independence among errors (a dubious assumption) are inadequate.

Several applications of bond graphs were described. The comparison of passive and semiactive vehicle suspension proved quite interesting, for the bond graph representation captured the coupling of electrical, magnetic, and material subsystems. The modeling of large gas nets reported by D. Singer and the application of a three-axis-driven pendulum described by M.J.L. Tiernego demonstrated the range of bond graph applications in continuous simulation.

Three entire sessions were devoted to energy primarily using continuous simulation. This degree of interest in energy in this type of conference surprised the author, even allowing for the fact that a few of the papers might have been more appropriate to other sessions. Most of the presentation titles were of a technical nature with restricted boundaries and objectives. The majority of the applications presentations employed continuous models.

Summary

The author has held the opinion for some time that continuous simulation research was more active in Europe than discrete event simulation research, and that the reverse was true for the US. This opinion seems to have been affirmed by the "Simulation '80" symposium. Outside the major research centers such as the Norwegian Computing Center, several locations within the UK (Imperial College, Univ. of Birmingham and Univ. of Lancaster), and more recently Aarhus University in Sweden, little research activity spanning the scope of discrete event methodology is apparent in Europe. In contrast to that, research spanning the entirety of continuous simulation is evident at many European locations.

The following conclusions are based on a comparison of current research interests, primarily but not totally in discrete event simulation, in Europe, as reflected by "Simulation '80", and the US:

(1) Hardware effects, such as distributed processing, the reduction in costs stimulating parallel processing, and the flexibility of microprogrammed instruction sets, have not influenced current research in Europe to the extent seen in the US.

(2) The emergence of software development technology is not recognized as clearly by researchers in Europe nor is it exerting as strong an influence.

(3) Bond graph modeling of physical systems has made a major impact in Europe, and the application and extension of bond graphs appear to exceed those in the US.

(4) Although the particular presentations which would have treated them were cancelled, developments relating to program generators and natural language interfaces for simulation model creation appear to be much more advanced in Europe than corresponding model development techniques in the US.

Finally, announcements and printed publicity underscored the large number of meetings on simulation scheduled to be held in the near future. (At least three future conferences dealing with Simulation have been announced by IASTED alone: "Modeling, Identification and Simulation" [Devos, Switzerland, 12-14 February, 1981], "Modeling and Simulation in the Service of Man" [Mexico City, Mexico, 15-17 April, 1981], and "*Simulation, Modeling and Development*" [*Cairo, Egypt*, 1-3 September 1981]). So many were noted that some concerns about the possibility of an "overkill" were raised in the mind of the author. A fixed level of research contributions divided among an ever-increasing number of meetings can dilute the critical mass necessary to make individual meetings productive. To appreciate the reality of this concern, one should note that the calendars of *Simulations News Europe*, (Volume 1980, Number 1) and the *Communications of ACM* (Volume 23, Number 5, May 1980) list a total of eleven meetings with "simulation" in the title between 1st July 1980 and 31st December 1981. This number seems excessive when viewed in the context of the number of sessions in simulation within various spheres of interest, e.g., The American Institute of Industrial Engineers (AIIE), The Association for Computing Machinery (ACM), The International Association for Mathematics and Computers in Simulation (IMACS), the Institute of Electrical and Electronic Engineers (IEEE), The Operations Research Society of America (ORSA), The Society of Computer Simulations (SCS), The Institute of Management Sciences (TIMS) and others.

APPENDIX

SYMPOSIUM '80

Last Minute Program

Course: June 23 and 24, 1980

Monday, June 23, 1980

10:00 - 12:00 a.m. Ill-Defined System Modeling
G.C. Vansteenkiste / J.A. Spriet (Belgium)
Modeling Ill-Defined Systems

N. Müller (FRG)
Hierarchic-Sequential Decomposition - A Comprehensive Approach for Real-Structure Modeling of Social Systems

M. Walliser (Switzerland)
Cross Impact Modeling - Step towards an Implementation Oriented Model-Building Paradigm or Methodological Failure?

2:00 - 3:20 p.m. Large Scale System Modeling I
K. Leimkühler (FRG)
Some Methodological Problems in Energy Modeling

J.D. Lebel (France)
Systems Dynamics

3:20 - 3:50 p.m. COFFEE BREAK

3:40 - 5:10 p.m. Large Scale System Modeling II
A. Sydow (GDR)
Hierarchical Concepts in Modeling and Simulation

R.G. Sargent (USA)
Verification and Validation of Simulation Models

5:10 - 5:50 p.m. Experimentation with Models
J.P.C. Kleijnen (The Netherlands)
Experimentation with Models: Statistical Design and Analysis Techniques

Tuesday, June 24, 1980

9:00 - 10:20 a.m. Graphical Techniques in Modeling
A.A.B. Pritsker (USA)
The Many Interfaces of SLAM

J.J.van Dixhoorn (The Netherlands)
Bond Graphs and the Challenge of a Unified Modeling Theory of Physical Systems

10:20 - 10:50 a.m. COFFEE BREAK

SYMPOSIUM, June 25 - 27, 1980

SIMULATION METHODOLOGY AND TECHNIQUES

Lecture Hall A

Wednesday, June 25, 1980

9:30 - 10:00 a.m. OPENING SESSION

10:00 - 10:30 a.m. COFFEE BREAK

10:30 - 12:10 a.m. Modeling Methodology
Chairman: T.I. Oren (Canada)

10:30 - 10:50 a.m.
A.van Hoof / F. Broeckx (Belgium)
Specification of Queueing Models: An Alternative Notation

10:50 - 11:10 a.m.
B. Thober (FRG)
Real Structure Modeling in the Social Sciences:
A Special Approach for Regional Systems

11:10 - 11:30 a.m.
M. Benrejeb / G. Dauphin / P.E. Borne (France)
Sur une nouvelle approche de la modelisation et de la simulation des processus non lineaires

11:30 - 11:50 a.m.
J. Militky / J. Čap / G. Künzel (CSSR)
Regression Modeling of Physical Systems

11:50 - 12:10 a.m. (cancelled)
J.R. Marsden / V. Salas / A. Whinston (USA)
Model Verification Using Simulated and Historical Data

2:00 - 3:40 p.m. Distributed System Simulation
Chairman: W.J. Karplus (USA)

2:00 - 2:20 p.m.
M. Köhne (FRG)
Distributed Parameter Optimal Model-Following Control System and Observer Synthesis

2:20 - 2:40 p.m.
R.N. Ghose (USA)
Simulation of Long-Range EM Propagation Characteristics in Nonuniform Media

2:40 - 3:00 p.m.
S. Sengupta / D. Dasgupta / K.F. Wong / E. Daly / S. Farooq / H.P. Gerrish (USA)
Numerical Simulation of Chemically Reacting Flow Through Soils: A Parametric Study

3:00 - 3:20 p.m.
L. Ascione / A. Grimaldi / F. Maceri (Italy)
Modeling and Analysis of Beams of Tensionless Foundations

3:20 - 3:40 p.m.
R. Toscano / A. Maceri / F. Maceri (Italy)
Analyse numerique de quelques problemes de contact en theorie des membranes

3:40 - 4:00 p.m. COFFEE BREAK

4:00 - 5:20 p.m. Numerical Methods
Chairman: R.E. Crosbie (UK)

4:00 - 4:20 p.m.
E. Eitelberg (FRG)
Modular Simulation of Large Stiff Systems

4:20 - 4:40 p.m.
M.B. Carver (Canada)
Parameter Identification Using Optimization Techniques in the Continuous Simulation Programs FORSIM and MACKSIM

4:40 - 5:00 p.m.
Y.T. Chan / J.M. Riley / J.B. Plant (Canada)
Modeling Time Delay by a Finite Impulse Response Filter

5:00 - 5:20 p.m.
Y. Balcou (France)
Comments on a Numerical Method Allowing an Improved Analysis of Multiexponential Decay Curves

5:20 - 6:00 p.m. Program Generators
Chairman: R.E. Crosbie (UK)

5:20 - 5:40 p.m. (cancelled)
C. Vidallon (France)
GASSNOL, A Computer Subsystem for the Generation of Network Oriented Languages with Syntax and Semantic Analysis

5:40 - 6:00 (cancelled)
S. Brandi / T. Pedrotti (Italy)
A Methodology to Generate Families of Computer Simulation Programs

Thursday, June 26, 1980

9:00 - 10:00 a.m. Plenary Session I

T.I. Oren (Canada)
Computer-Aided Modeling Systems (Invited Lecture)

10:00 - 10:30 COFFEE BREAK

10:30 - 11:30 a.m. Statistical Aspects of Simulation
Chairman: J.P.C. Kleijnen (The Netherlands)

10:30 - 10:50 a.m.
P. Heidelberger / P.D. Welch (USA)
A. Spectral Method for Placing Confidence Limits on Simulation Steady State Characteristics

10:50 - 11:10 a.m.
R.T. Stroup (FRG)
Estimating Confidence Intervals by the Autogressive Method

11:10 - 11:30 a.m.
G. Rzevski (UK)
On the Use of Markov Processes for the Interactive Computer-Aided Solution of Discrete-State Stochastic Simulation Problems

7:30 - 9:30 Bond Graph Modeling Techniques
Chairman: J.J.van Dixhoorn (The Netherlands)

7:30 - 7:50 p.m.
J.W. Meerman (The Netherlands)
THTSIM, Software for the Simulation of Continuous Dynamic Systems on Small and Very Small Computer Systems

7:50 - 8:10 p.m.
P.C. Breedveld (The Netherlands)
Thermodynamic Bond Graphs: A New Synthesis

8:10 - 8:30 p.m.
D. Hrovat (USA)
Bond Graph Modeling of a Pneumatic Passive and Semiactive Vehicle Suspension

8:30 - 8:50 p.m.
M.J.L. Tiernego (The Netherlands)
Bond Graph Modeling and Simulation Techniques Applied to a Three Axis Driven Pendulum

8:50 - 9:10 p.m.
D. Singer (Hungary)
Bond Graph Models for Large Gas Nets

9:10 - 9:30 p.m.
J.R. Jaworwski / T. Rys (Poland)
A Fast Loop Analyser and its Applications to Testing of Large Computer Models

Friday, June 27, 1980

9:00 - 10:00 a.m. Plenary Session II
Dr. Frohberg (FRG)
The International Linkage of Open Exchange Models for World Food Supply (Invited Lecture)

10:00 - 10:30 a.m. COFFEE BREAK

10:30 - 12:10 a.m. Simulation Software
Chairman: F.E. Cellier (Switzerland)

10:30 - 10:50 a.m.
B. Schmidt (FRG)
The Way Ahead in Discrete Simulation. A Critical Assessment of Languages and Packages for the Simulation of Discrete Systems

10:50 - 11:10 a.m.
H. Charapry / B.C. Kastler / C.E. Riethmüller (FRG)
An Experimental Natural Language Oriented Modeling System Supporting Industrial and Governmental Planners

11:10 - 11:30 a.m.
B. Gernoth (FRG)
Simulation of Discrete Systems Using GPSS-FORTRAN

11:30 - 11:50 a.m.
D. Lienart / R. Gorez (Belgium)
SIMUL, A New Continuous Systems Simulation Language for Minicomputers

11:50 - 12:00 a.m.
F. Gausch (Austria)
DASP - Ein Internktives Simulationsprogram für DDC-Systeme

2:00 - 4:20 p.m. Simulation Hardware
Chairman: L. Dekker (The Netherlands)

2:00 - 2:20 p.m.
K.U. Hellmold (FRG)
Multiprocessorsystem for Simulation Purpose Based on GPSS-FORTRAN

2:20 - 2:40 p.m.
J.H.M. Andriessen (The Netherlands)
Discrete-Time Parallel Algorithms with Continuous-Time Response

2:40 - 3:00 p.m.
R. Frieling (FRG)
Increasing the Computing Speed of Real-Time Simulation by Hardware Supplements and Selected Software

3:00 - 3:20 p.m.
G.D. Challands / M.G.K. Evans (UK)
Implementation of a Training Simulator Using a General Purpose Hybrid Computer System

3:20 - 3:40 p.m.
R. Kern (FRG)
Frequency Response Analysis Using a Hybrid Computer

3:40 - 4:00 p.m.
F.G. Wittling (France)
Recent Trends in Analog Simulation with Micro Synchrone Machines

4:00 - 4:20 p.m.
G. Mesnard (France)
Simulation directe par reseau electrique

4:30 - 4:45 p.m. CLOSING SESSION

TECHNICAL APPLICATIONS

Lecture Hall B

Wednesday, June 25, 1980

10:30 - 12:10 a.m. Electrical and Mechanical Systems I
Chairman: P. Till (Austria)

10:30 - 10:50 a.m.
M. Meunier / P. Turelle / G. Rossetto (France)
Simulation d'un appareil propulsif de navire

10:50 - 11:10 a.m.
D. Pinchon / G. Manesse (France)
Sensibilité du moteur pas-à-pas au moyen d'un modèle a deux paramètres

11:10 - 11:30 a.m.
R. LeDoeuff / C. Iung (France)
Digital Simulation of a Three Phase Cycloconverter Including Control and Firing Devices

11:30 - 11:50 a.m.
G. Lekkas (Switzerland)
Simulation einer Stromrichterlokomotive zur Bestimmung der Stromoberschwingungen und deren Ausbreitung in den Leitungen

11:50 - 12:10 a.m.
D. Kalavszky (Hungary)
A Novel Approach to the Digital Simulation of Converter-Fed Controlled Drives

2:00 - 3:40 p.m. Electrical and Mechanical Systems II
Chairman:

2:00 - 2:20 p.m.
P. Till / J. Mitterauer / M. Haider (Austria)
Computer Model of the Transient Thermal Response of Cathode Cavities

2:20 - 2:40 p.m.
S. Kim / M. Hamy / R. Mezencev (France)
Simulation hybride d'un actionneur linéaire electromagnétique à reluctance variable

2:40 - 3:00 p.m.
J. Robert (France)
The Use of Topological Methods for the Simulation of Electric Machines

3:00 - 3:20 p.m.
J.P. Courat / J.F. Pòne / R.C. Castagné /
P. Bonjour (France)
Submicrometer Electron Devices

3:20 - 3:40 p.m.
F.G. Wittling (France)
Analogical and Digital Simulation of a Nonlinear
Analogical-Digital Conversion

3:40 - 4:00 p.m. COFFEE BREAK

4:00 - 5:20 p.m. Control Systems Design
Chairman: M. Köhne (FRG)

4:00 - 4:20 p.m.
C.N. Wormald / S.Y. Fakhouri (UK)
An Interactive Computer Program Library for Nonlinear
Identification and Control System Design

4:20 - 4:40 p.m.
E. Hasenjäger (FRG)
Design and Simulation of Adaptive Observers for
Vibrating Systems

4:40 - 5:00 p.m.
S. Oelcer / A. Roch (Switzerland)
Hybrid Simulation Study of an Adaptive Stochastic Control

5:00 - 5:20 p.m.
L. Bakule (CSSR)
On an Optimal Decentralized Control Design with
Incomplete Feedback

Thursday, June 26, 1980

10:30 - 12:30 a.m. Simulation of Computer Systems
Chairman: G. Rzevski (UK)

10:30 - 11:10 a.m.
R.F. Garzia (USA)
Computer Modeling - A Complete Case Study for the MVS
Computer System (Double length key paper)

11:10 - 11:30 a.m.
G. Lazzaretti / D. Maio (Italy)
A Simulation Tool to Design Distributed Computer Systems

11:30 - 11:50 a.m.
W. Kunft / M. Paul (Austria)
Simulation eines Datenpaketvermittlungsnetzes mit Prozessrechnern

11:50 - 12:10 a.m.
A.J. Surkan (USA)
Simulation in Evaluating Video Disk Item Permutations

12:10 - 12:30 a.m. (cancelled)
A.L. Goel (USA)
Software Reliability and Performance Evaluation with Applications to a Real-Time System

7:30 - 9:10 p.m. Energy I
Chairman: F.G. Wittling (France)

7:30 - 7:50 p.m.
G.L. Schaffar / W.R. Woeber (Austria)
Optimization and Simulation of a Control-System for Solar-Thermal Installations

7:50 - 8:10 p.m.
K.H. Fasol / M. Hoppe (FRG)
Modeling and Simulation of a Water Power Plant

8:10 - 8:30 p.m.
P. Fanghella / V. Mezzadra / A. Rossi (Italy)
A General Model to Simulate Drum-Boiler Turbine Group

8:30 - 8:50 p.m.
S.M. Rathjen / E.J. Nalos (USA)
Computer Simulation of the Microwave Power Transmission System for the Space Solar Power Satellite

8:50 - 9:10 p.m.
S. Mustafa / M. Dessouky / M. Paine / H. Abu Rashid / H. El-Mansy (Kuwait)
Simulation and Design of Solar Greenhouses

Friday, June 27, 1980

10:30 - 12:30 a.m. Energy II
Chairman: M.B. Carver (Canada)

10:30 - 10:50
B.M. Weedy / F.R.F. de Lima (UK)
Thermal Modeling of Power Cables with Evaporate Cooling

lo:50 - 11:10 a.m.
G. Praxl (Austria)
Stochastic Models for Simulating the Breakdown Probability of High-Voltage Insulation Systems

11:10 - 11:30 a.m.
A.E. Davies / D.M. German (UK)
Simulation of Switching Transients on Long Transmission Lines

11:30 - 11:50 a.m.
R.D. Findlay (UK)
Economic Models for Overhead Transmission Conductors

11:50 - 12:10 a.m.
B. Rouben (Canada)
Improvements in Numerical and Computational Techniques for CANDU Neutronics

12:10 - 12:30 a.m.
N.P. Kolev / B. Manahilov / C. Dimitrov (Bulgaria)
Application of the Pseudo Characteristic Method of Lines to 1D Transient Thermohydraulics Analysis for Nuclear Reactors

2:00 - 4:20 p.m. Energy III
Chairman: R.C. Michelini (Italy)

2:00 - 2:20 p.m.
P.H. Howard (Canada)
Modeling the Supply/Requirements Interaction for Natural Gas in Canada

2:20 - 2:40 p.m.
W. Kaiser / H. Glavitsch (Switzerland)
Effectiveness Evaluation of System Control in Electric Power Systems by Discrete Modeling and Simulation

2:40 - 3:00 p.m.
C. Greco / V. Marchis (Italy)
Modeling and Identification of a Counterflow Heat Exchanger

3:00 - 3:20 p.m.
A. Bonnemay (France)
Utilisation de systèmes algébro-differentiels implicites dans la modelisation et la simulation de processus de generation d'energie

3:20 - 3:40 p.m.
B. Joos / M. Roch (Switzerland
Stockage de chaleur à faible profondeur: Simulation
par élements finis

3:40 - 4:00 p.m.
A. Rizk Abu El-Wafa / M. Tawfik / M.S. Mansour (Egypt)
Digital Simulator for Studies of Power System Stability
as Affected by Protective Relaying

4:00 - 4:20 p.m.
M.L. Barcella / P. Gilmore (USA)
Modeling Representation of New Energy Technologies

NON-TECHNICAL APPLICATIONS

Wedensday, June 25, 1980

10:30 - 11:50 a.m. Production Systems
Chairman: A.A.B. Pritsker (USA)

10:30 - 10:50 a.m.
R.R. Duersch / D.B. Wheeler (USA)
An Interactive Scheduling Model for Assembly-Line Manufacturing

10:50 - 11:10 a.m.
R. Cepolina Molfino / L. Torri (Italy)
Digital Simulation of a Computer Controlled Production Center

11:10 - 11:30 a.m.
J. Eelkman Rooda (The Netherlands)
Discrete Event Simulation for the Design and Operation
of Grain Terminals

2:00 - 3:40 p.m. Inventory Systems
Chairman:

2:00 - 2:40 p.m.
E.A. Silver (Canada)
Simulation of a Coordinated Inventory Control Problem
(Double length key paper)

2:40 - 3:00 p.m.
M.A. Geisler (USA)
Statistical Properties of Simulation Models Used in
Studying Inventory Problems

3:00 - 3:20 p.m.
W. Bruggeman / H. Muller / P.de Muyter (Belgium)
Cost-Effectiveness of Heuristic Decision Rules for Inventory Systems with Stochastic Dynamic Demand

3:20 - 3:40 p.m.
M. Kamber (Switzerland)
Unterhalt und Reparatur von identischen Objekten in einer vorgegebenen Logistikstruktur

3:40 - 4:00 p.m. COFFEE BREAK

4:00 - 5:00 p.m. Transportation
Chairman: M.A. Geisler (USA)

4:00 - 4:20 p.m.
H. Benninger (Switzerland)
Eine praktische Methodologie für Simulations-Modelle in internen Transportsystemen

4:20 - 4:40 p.m.
G. Bel / J.P. Emmanuelli / J.F. Gabard/ M. Marty (France)
Modular Simulation of an Automatic Transportation System Operating on a Mesh Network

4:40 - 5:00 p.m.
E. Cornacchia / P.P. Puliafito (Italy)
Performance Evaluation of a Railroad Node by Simulation

5:00 - 6:00 p.m. Public Systems
Chairman: M.A. Geisler (USA)

5:00 - 5:20 p.m.
F. Benito (Switzerland)
Performance Evaluation of Ambulance Services: A Simulation Model

5:20 - 5:40 p.m.
I. Gottlieb (USA)
Simulation of the Computer Dispatch System of the Fire Department of New York City

5:40 - 6:00 p.m.
J. Werewka (Poland)
Simulation of a Public Tranport System

Thursday, June 26, 1980

10:30 - 12:30 a.m. Economy
Chairman: K. Leimkühler (FRG)

10:30 - 11:10 a.m.
V. Kouskoulas / S.G. Tzarfestas (Greece)
Modeling and Identification of Two-Sector Growth Economic Models (Double length key paper)

11:10 - 11:30 a.m.
V. Chari / M.C. Imbert-Bancora (France)
Macro-Economic Model Simulation and Software in MODULECO

11:30 - 11:50 a.m.
A.R. Probst / A.L. Fischer (Switzerland)
A Simulation Approach for Information System Design

11:50 - 12:10 a.m.
J.R. Jaworowski / J. Majewski (Poland)
Dendrit Reference and Manipulation System for Modeling the Growth of Chemical Industry

12:10 - 12:30 a.m.
A. Kornecki / J. Ramocki (Poland)
Modeling of School System as Part of National Economy System

7:30 - 9:10 p.m. Chemical Systems
Chairman: M.H. Hamza (Canada)

7:30 - 7:50 p.m.
A.F. Johnson / B. Khaligh / J. Ramsay (UK)
Simulation and Control of Binary Copolymerisation System

7:50 - 8:10 p.m.
R.A.M. Hagervorst / A. Johnson (The Netherlands)
A Comparison of Two Methods for Simulating a Chemical Process

8:10 - 8:30 p.m.
F.J. Pasveer / J.N. van der Molen / J.J. de Kramer (The Netherlands)
Diffusion Flow through Irregular Shaped Pores

8:30 - 8:50 p.m.
N.G. Koumoutsos / G. Bafas (Greece)
The Use of a Pneumatic Simulator in Determining the Dynamic Behavior of Chemical Process Control Systems

8:50 - 9:10 p.m.
J. Chojnacki / H. Langmann / M. Zaczyk / J. Krajewski (Poland)
Digital Simulation of Rectifying Column in the Steady State

Friday, June 27, 1980

10:30 - 12:30 a.m. Social and Biological Systems
Chairman: G.C. Vansteenkiste (Belgium)

10:30 - 11:10 a.m.
J.R. Barrett / R.M. Peart (USA)
System Simulation in US Agriculture
(Double length key paper)

11:10 - 11:30 a.m.
L. Dekker / E.J.H. Kerckhoffs / T.C. Wong (The Netherlands)
Simulation as a Method to Evaluate Alternative Electoral

11:30 - 11:50 a.m.
R. Starkermann (Canada)
Die Arbeitsstörung durch den Aggressionsneurotiker

11:50 - 12:10 a.m.
H. Geyer (Austria)
Modeling the Perception of Changes of Brightness (flicker)

12:10 - 12:30 a.m.
F. Scheild (USA)
Simulating Golf to Find an Accurate Ability Measure

2:00 - 3:40 p.m. Water and Air
Chairman: A. Sydow (GDR)

2:00 - 2:40 p.m.
F.J. Kraus / U. Schreiber / A. Schröder (FRG)
Modeling and Simulation of Urban Sewer Systems
(Double length key paper)

2:40 3:00 p.m.
R. Laurent / M. Barboucha (France)
Simulation d'un bassin de traitement biologique des eaux usées

3:00 - 3:20 p.m.
P. Bolzern / G. Fronza (Italy)
Computer Simulation of a Real-Time Control Scheme of Air Quality

3:20 - 3:40 p.m.
A. Kraszewski / R. Soncini-Sessa (Italy)
A Package for Automatic Identification of a BOD-DO River Quality Model

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