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Newsletter

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Systems Analysis and Simulation

Organized by the Central Institute of Cybernetics and Information Processes of the Academy of Sciences of the GDR, and cosponsored by IFAC, IMACS and the Chamber of Technology of the GDR (Chairman: A. Sydow), the Symposium took place in the historical building of Humboldt University in Berlin/GDR on Sept. 1—5, 1980.

24 countries were represented among the 315 participants. 150 contributed papers and 18 invited and survey papers were presented. Furthermore two round table discussions offered the possibility to exchange views on **simulation software** and on **systems engineering education,** the latter was organized by the IFAC-**EDCOM** and chaired by P. M. Larsen, Technical University of Denmark at Lyngby. IFAC was represented by its vice-president M. Thoma, Technical University of Hannover, FRG.

The invited papers presented were of a very high quality and gave an excellent insight into the main recent developments of systems analysis. The topics treated included:

- "Non-linear systems analysis" by R. K. Mehra, Scientific Systems Inc., Cambridge, MA.
- "Distributed systems simulation" by R. Vichnevetsky, IMACS-President, Rutgers University, New Brunswick, N.Y.
- "Robustness of simulation software" by F. E. Cellier, ETH Zürich, Switzerland.
- "Hierarchical control systems" by W. Findeisen, Technical University, Warsaw, Poland.
- "Theoretical model building and simulation of industrial processes" by K.H. Fasol, Ruhr-Universität, Bochum, FRG.
- "Simulation of environmental systems: An academic exercise?" by G.C. Vansteenkiste, Rijksuniversiteit Gent, Belgium.
- "Optimization and other non-classical concepts in systems modelling" by I. Troch, Technische Universität Wien, Austria.
- "New directions in systems simulation — methodology and software" by T. I. Ören, University of Ottawa, Canada.
- "Mathematical and simulation models in systems analysis — examples and experiences" by A. Sydow from the organizing institute.

Due to the wide scope of the symposium up to four parallel session were performed out of the seven topical sections.

The section on **methods of systems analysis** was concerned with theoretical approaches, among them fuzzy systems, polyoptimization. Systems with distributed parameters and hierarchical systems were well represented, game-theoretical methods and systematic decomposition have gained importance for the latter. The desire to work with simple models resulted in a great number of papers dealing with model reduction and the subsequent (suboptimal) control of reduced models.

Model building and identification was the topic of the second section, which showed the strong interest in identification methods for non-linear and distributed systems. Special attention was given to the invited paper of Greenspan (Arlington/Texas) on time-discrete modelling of continuous systems.

Considerable time was allotted to the section on **simulation systems,** with four invited papers related to it. The contributions showed the still growing interest in complex simulation systems for systems analysis purposes (modular model and simulation systems, combined systems etc.) and in robust simulation, including also transparency and flexibility. Special topics were simulation software for distributed systems, hybrid simulation and especially simulation languages, to which a round table chaired by F. E. Cellier was related.

The fourth section was concerned with **applications to industrial and technological systems,** which covered widely differing fields such as chemical reactors and energy systems.

Mainly **discrete models for service and traffic systems** were the topic of the fifth section, to which both theoretical contributions e.g. on cyclic control and simulation studies of urban transportation were related.

Relatively much space was given to the section on **biological, ecological, environmental and hydrological systems.** Systems analysis becomes especially pertinent to them since it is the only way to derive management strategies for ill-defined and soft-systems, as it was stressed several times.

Special attention was given here to the invited papers of G. Koch, University of Rome, on stochastic modelling in biology and of K. Reinisch, Technical College Ilmenau, GDR, on combining methods of systems analysis and control engineering for operating large-scale water resources.

Similar Problems were the background of the section on **global and regional systems,** which are in most cases large, ill-defined and soft. Mainly papers on social systems and energy problems, including one of IIASA, were presented here.

Quite generally, the symposium proved the very high value the tools of simulation-based systems analysis have gained applied to the most different problems and tasks.

Automatic Control in Power Generation, Distribution and Protection

The symposium was held in the Conference Centre of the Council for Scientific and Industrial Research (CSIR) in Pretoria, Republic of South Africa, from 15 to 19 September 1980. Over three hundred delegates attended, including 60 from other countries. The 52 submitted papers covered a wide range of topics in the electric power field and were discussed in sessions on:

- control of power systems;
- control and protection schemes and equipment;
- control of power system plant;
- control centre concepts and equipment;
- power system dynamic performance;
- security and reliability;
- identification, modelling and simulation;
- control theory.

One day was reserved for three technical visits. These included the National Control Centre of the Electricity Supply Commission which regulates the economic dispatch and security of power supply to six regional control centres. The national overlay system operates through 440, 275, 220 and 132 kV transmission networks and currently supplies over 90 TWh/annum from an installed generating capacity of 16,000 MW.

The second visit was to the Apollo distribution station near Apollo. This is the terminal station on the 1400 km HVDC transmission line (±533 kV), which delivers power from the 2000 MW Cabora Bassa hydro-generating station on the Zambezi river in Mocambique. The Apollo inverter station utilises disc-type thyristors arranged in an 8 bridge configuration — each bridge being rated for 240 MW, 133 kV, 1800 A.

The final visit was to the ultra-modern system control centre of the Johannesburg City Council Electricity Department — which in particular includes a sophisticated computer based supervisory control and telemetry system.

Apart from these technical excursions, several evening social events provided opportunity for less formal contact amongst the delegates.

Invited review papers served as key-note addresses on three of the four session days.

The first was presented by Prof. F. J. Evans of Australia, on the subject of a multi-variable servo mechanism approach to automatic generation control, in which he outlined some results of recent research in this field.

Prof. R. Isermann of Germany dealt with computer control methods for power stations based on process identification, covering both computer aided and self-adaptive control algorithm designs.

Two review papers centered on power system disturbances. The first by Mr. M. S. Baldwin of the USA, dealt with generator mechanical and electrical interaction during such disturbances, identifying some causes of mechanical stresses and suggesting various protective techniques. The other, by Mr. R. R. Slatem of South Africa dealt with modern trends in power system protection. Digital methods, including the use of microprocessors, were covered as well as trends in power system design which affect protection.

The presentation of Prof. Glavitsch of Switzerland covered the application of modern control theory to generator and system control. Excitation control and optimal power flow, specifically, were discussed in some detail.

Mr. G. Engstrom of Sweden dealt with electronics in future power systems in his review paper. Fibre optics received special attention.

The two round table discussions, which were well supported by the delegates, covered simulation and modelling in system planning, and distributed processing in power system operation. A particular feature of these was the degree of delegate participation — leading to a lively flow of questions and discussion.

The injection of fresh ideas and new concepts, approaches and solutions played an important part in the 1980 IFAC symposium, and this should stimulate future research.

The increasing role of sophisticated concepts of automation and control in the reliable operation of modern complex power systems was very evident in the symposium, which also highlighted the importance of automation generally in the field of electric power, with particular emphasis on the conservation of primary energy and the utilization of available sources at maximum efficiency.

It was recommended to the Applications Committee that the rapid development and evolution in the field justifies a regular series of symposia in the future.

FORTHCOMING EVENTS

TENTH IFIP CONFERENCE ON SYSTEM MODELLING AND OPTIMIZATION
(New York City, USA, August 31—September 4, 1981)

Sponsored by the International Federation for Information Processing

Theme:
Advances in mathematical representation and optimization of engineering, socio-technical, and socio-economic systems.

Topics:
Optimal and stochastic control; mathematical and combinatorial programming; computational complexity; computer system modeling; mathematical economics; policy modeling; biomedical control.

Papers:
One-to-two page abstracts of original, unpublished results to be submitted by Feb. 15, 1981. Notification of acceptance by April 30, 1981.

All correspondence should be adressed to
10th IFIP Conference
Polytechnic Institute of New York
333 Jay Street
Brooklyn, N.Y. 11201, U.S.A.
Telephone: (212) 643-2305

IMEKO/IFAC - 2nd INTERNATIONAL SYMPOSIUM ON TECHNICAL DIAGNOSTICS
(London, UK, November 17 — 19, 1981)

Sponsored by:
International Measurement Confederation (IMEKO) — Technical Committee on Technical Diagnostics (TC 10)
Cosponsored by: IFAC
Organized by:
The Institute of Measurement and Control, London.

Scope:
The Symposium will deal with the diagnostics of machines, structures, systems and electro-technical devices. Attention will be focused on theoretical problems, methods of technical diagnosis, maintenance, check-out and testing equipments.

Language:
English, but provision may be made for translation of papers presented in French, German or Russian.

For further enquiries please contact:
Technical Diagnostics Symposium
The Institute of Measurement and Control
20 Peel Street, London W8 7PD, UK

GLOBAL MODELING AT THE SERVICE OF THE DECISION MAKER
(September 14—18, 1981, Laxenburg Austria)

Organizer:
The International Institute for Applied Systems Analysis (IIASA)

Scope and purpose of this forum:
Global models are computer simulation models that address complex problems of global scale. The first global model resulted in the widely-discussed book "The Limits of Growth", published in 1972. Since then at least ten other models of global scope have been constructed. These large-scale studies of global futures represent many different ideologies, purposes, methods, and results. At the 9th IIASA Global Modeling Conference leading representatives of all major models will be assembled, for the first time in history, ready to discuss their work with an international audience of policymakers, professional communicators, and scientists.

For further information please write to
IIASA — Global Modeling Review
Schloßplatz 1
A-2361 Laxenburg, Austria

WHAT GOES IN IFAC

The VDI/VDE-Gesellschaft Mess- und Regelungstechnik (GMR) — the German NMO

The joint federation of the two German Engineering Associations VDI Verein Deutscher Ingenieure (more than 75.000 members) and VDE Verband Deutscher Elektrotechniker (more than 30.000 members) was founded in 1973 under the presidency of Dr. O. Winkler.

Right now the GMR has more than 6.000 members. These members elect the Leading Council of the GMR for a period of three years. The president at the moment is Professor Dr.-Ing. T. Pfeifer, RWTH Aachen (President of IMEKO 79 — 82), the scientific secretary Mr. H. Wiefels.

Aims, structure, activities

The purpose of GMR is to promote technology and science of measurement and automatic control in both theory and applications by information dissemination through congresses, symposia etc. and/or publications in cooperation with other national and international organizations.

The VDI/VDE-GMR is the national member organization of IFAC as well as of IMEKO.

The association is subdivided into 7 divisions.

- Principles and theory
- Methods of measurement
- Components and instruments
- Process computers
- Control systems
- Automatic control in power stations, chemical and other processes, power electronics, transportation etc.
- Measurement and control in manufacturing technology

The scientific and technical activities of the above mentioned divisions are accomplished in about 80 working groups which consist of 10 — 30 members each. The results of the working groups are documented and published as

- VDI/VDE-Guidelines
  which reflect the current state of the art. They are written in the form of recommendations and partly available in English language, e. g. VDI/VDE-3551 "Recommendations for noise-immunity of signal transmission when applying process computers".
- Data sheets
  e. g. for automatic control systems used for various types of nuclear power stations
- Catalogues
  e. g. Process models
- Reports in technical journals.

Further activities of the working groups are:

- The preparation of post graduate education courses
- The preparation of workshops, symposia, conferences and congresses organized by GMR, which are partly sponsored by national and international organizations like IFAC, IMEKO, IFIP, SESA etc.

For example 18 IFAC and/or IMEKO events have been organized by the GMR in the past. GMR is also preparing the 9th IMEKO World Congress, which will take place in Berlin (West) from May 24 to May 28, 1982, and the 10th IFAC World Congress in 1987. It will be a great honour for the VDI/VDE-GMR to organize this 10th IFAC Congress especially because the idea of IFAC was born during a conference which was organized by the VDI/VDE-Automatic Control Committee in Heidelberg in 1956.

The success of the GMR is based on its activities (only some selected items have been mentioned above) and in particular on the individual support by its members.

GMR's future activities are of course to a great extent related to the growth and development of our technology and its influence on other fields.

FORTHCOMINIG EVENTS (ctd.)

IFAC SYMPOSIUM ON CONTROL ASPECTS OF PROSTHETICS AND ORTHOPTICS (Ohio, USA, May 7 — 9, 1982)

This Symposium was by mistake announced previously as being scheduled for May 1983 (ref. Newsletter No. 1, January 1981 — List of IFAC Events 1981 — 1983).

The correct date is as above i.e. May 7 — 9, 1982.

We apologize for this error.

For further information please contact
C. Douglas Hetrick
AACC Secretariat
67 Alexander Drive, PO Box 12277
Research Triangle Park, NC 27709, USA

WORKING CONFERENCE ON MODEL REALISM (April 1982, Bonn, FRG)

Sponsored by:
Gesellschaft für Mathematik und Datenverarbeitung (GMD)

Cosponsered by:
Society of General Systems Research (SGSR)

Scope:
The Conference will deal with the modeling characteristics of different methodologies and is intended to initiate a comparative discussion as to what extent these methodologies can be used or combined in order to contribute to solutions of real world problems; how far can they adequately model key phenomena and aspects of real world systems; how do they keep track of uncertainty of observations, of concurrency of events, of a (partial) autonomy or of multifunctionality of system components.

For further information and for copies of the call for papers please contact
Horst Wedde
Gesellschaft für Mathematik und Datenverarbeitung Bonn
PO Box 1240
D-5205 St. Augustin 1, FRG

3rd IFAC SYMPOSIUM ON CONTROL OF DISTRIBUTED PARAMETER SYSTEMS (29 June — 2 July 1982, Toulouse, France)

Organizer:
AFCET — Association Française pour la Cybernétique Economique et Technique together with the Centre d'Etudes et de Recherches de Toulouse (C.E.R.T.), the Institut National de Recherche en Informatique et en Automatique (I.N.R.I.A.) and the Laboratoire d'Automatique et d'Analyse des Systèmes, Toulouse (L.A.A.S.).

Purpose:
The aim of the Symposium is to present the state of the art in the field of Control of Distributed Parameter Systems. The symposium follows two symposia held in Banff (Canada) in 1971 and in Coventry (GB) in 1977.

Time schedule:

Abstract submission:	June 15, 1981
Full paper submission:	October 5, 1981
Acceptance for full papers subject to corrections	January 2, 1982
Final texts revised	March 1, 1982

Abstracts of papers, in English or French (200 — 300 words), should be sent in five copies, to

L. Le Letty
CERT-DERA, 2, av. E. Belin — B.P. 4025
31055 Toulouse Cedex (France)

All inquiries other than of administrative nature should be sent to the above mentioned address, administrative inquiries should be addressed to

A.F.C.E.T. — 156, Bld Péreire
75017 Paris, France

The IFAC Secretariat deeply regrets to inform of another severe loss our USSR Member Organisation had to suffer.

Prof. Dr. N. Rajbman
Member of the IFAC Advisory Committee passed away on January 8, 1981.

The International Programme Committee for the 6th IFAC Symposium on Identification and System Parameter Estimation, which is to take place in Washington, D.C., June 7 — 11, 1982, headed by its chairman, Prof. George N. Saridis from Purdue University, has decided to dedicate this symposium to the memory of their esteemed colleague, Dr. Rajbman.

NEW BOOKS

RECENTLY PUBLISHED IFAC VOLUMES	Publication Date
LAUBER: Safety of Computer Control Systems Workshop	23 June 1980
DE GIORGIO: Criteria for Selecting Appropriate Technologies under Different Cultural Technical and Social Conditions	30 April 1980
NOVAK: Software for Computer Control	19 December 1979
MUNDAY: Automatic Control in Space	30 April 1980
CUENOD: Computer Aided Design of Control Systems	30 May 1980
ISERMANN: Identification and System Parameter Estimation	9 September 1980
HARRISON: Distributed Computer Control Systems	28 July 1980
REMBOLD: Information Control Problems in Manufacturing Technology	29 August 1980
RAUCH: Control Applications of Nonlinear Programming	29 September 1980
HAASE: Real-Time Programming	February 1981
LESKIEWICZ: Pneumatic and Hydraulic Components and Instruments in Automatic Control	Due for publication February 1981

Available at Pergamon Press Headington Hill Hall, Oxford OX 3 OBW. UK.

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PAPERS

Internal Image Motion Compensation System for the Shuttle Infrared Telescope
(K. R. Lorell, E. K. Parsons, J. D. Powell)

Adaptive, High Precision Satellite Attitude Control for Microprocessor Implementation
(S. J. Dodds)

A Self Tuning Regulator for Multivariable Systems
(M. M. Bayoumi, K. Y. Wong, M. A. El-Bagoury)

Unification of Discrete Time Explicit Model Reference Adaptive Control Designs
(I. D. Landau, R. Lozano)

Algebraic Characterization of Fixed Modes in Decentralized Control
(B. D. O. Anderson, D. J. Clements)

BRIEF PAPERS

Automatic Control of Casting Speed in Ingot Casting
(T. Shiraiwa, Y. Sakamoto, S. Kobayashi, S. Anezaki, H. Kato, A. Kuwabara)

A Multivariable Self-Tuning Regulator to Control a Double Effect Evaporator
(F. Buchholt, M. Kümmel)

The Component Connection Model and Structure Preserving Model Order Reduction
(O. Wasynczuk, R. A. DeCarlo)

Speed Control of a Field Controlled DC Traction Motor
(M. Pachter)

Dynamic Controllers in Linear Multivariable Systems
(A. Balestrino, G. Celentano)

New Results in State Estimation and Regulation
(V. Kučera)

Equilibrium Strategies in Dynamic Games With Multi Levels of Hierarchy
(T. Basar)

FORTHCOMING EVENTS (ctd.)

JOINT IFAC/ESA SYMPOSIUM ON AUTOMATIC CONTROL IN SPACE (Noordwijkerhout, The Netherlands, 5 — 9 July 1982)

Sponsors:
IFAC — Technical Committee on Space and European Space Agency (ESA)

Organized by:
The Royal Institution of Engineers in The Netherlands, Division of Automatic Control (KIVI)

Purpose:
This ist the 9th IFAC symposium on Automatic Control in Space and the 2nd ESA Attitude and Orbit Control Symposium. The sponsors' fields of interest cover a wide range of topics, but in order to limit the scope of the symposium to some extent and achieve the most fruitful result, a major part of the programme will be devoted to practical applications. Of particular interest are control problems related to the following types of vehicles:

- satellites in geosynchronous orbit
- scientific and earth observation satellites
- manned space vehicles (Salyut, Space Shuttle, Spacelab) and their payloads, such as Instrument Pointing Systems.

Language:
The symposium language will be English. All abstracts and manuscripts will be in that language.

For further inquiries please write to
Joint IFAC/ESA Symposium on Automatic Control in Space
c/o K.I.V.I.
Postbus 30424
2500 GK 'S Gravenhage, The Netherlands

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WHO IS WHO IN IFAC

Prof. Dr. Karl Reinisch
Member of IFAC Executive Council

Karl Reinisch was born in 1921 in Dresden, German Democratic Republic. From 1952 — 1957 he was assistant professor at the Technical University of Dresden, Theoretical Electrotechnics, starting there the first research group on Automatic Control.

Since 1957 he had been head of a division in the Institute for Control Engineering of the Academy of Sciences of the GDR in Dresden which was established in this year. In 1957 he took the degree of Dr. Ing., in 1965 that of a Dr. sc. techn. from the Technical University Dresden.

Since 1960 he was head of the department of Control Engineering at the Ilmenau Institute of Technology, in 1965 he became full professor. After the reform of the universities in 1968 he was made first director of the new established Section for Technical and Biomedical Cybernetics including the departments for Automatic Control, Information Processing, Process Measurements and Biomedical Technics. There he organized an interdisciplinary research on model-building and control in industrial, biomedical, water resources and agriculturalproduction systems.

About 50 publications have appeared on analogue simulators, on problems of model-building and parameter estimation, on methods for synthesizing continuous and discontinuous (sampled data) control systems, on sensitivity analysis and on hierarchical control problems, most of them in "messen-steuern-regeln". He is the author of two textbooks on control sciences, co-author of handbooks and editor of 3 translated monographs.

Prof. Reinisch is a member of different national committees, of the executive committee of the Wissenschaftliche Gesellschaft für Meßtechnik und Automatisierung, the National Member Organization of the GDR for IFAC. 1972 — 1975 he was Vice-chairman of the Systems Engineering Committee, and from 1975 — 1978 member of the Advisory-Committee. Since 1978 he has been a member of the Executive Council of IFAC.