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Contents:

Report on the Program of the 10th IFAC World Congress
A Statistical Evaluation*)

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The 10th World Congress on Automatic Control took place in Munich, Federal Republic of Germany from July 27—31, 1987. 1432 participants from 46 countries followed the invitation.

This short report intends to show some aspects of the scientific program of the Congress and the interest of the participants in the particular subjects.

Plenary Sessions

Each morning the program started with a plenary paper presenting the general state-of-the-art and the future development of automatic control in relevant fields of application. After the opening session D. Ernst (FRG) reported on "Modern Development in Industrial Automation". He considered examples of industrial automation in power generation, oil and gas production and manufacturing systems and emphasized the role of communication systems, automation of mechanical and intellectual processes and international research. S. Narita (J) discussed "The Roles of Information Technology in Systems Control" showing historical developments towards integrated computer control systems and the impact on systems control such as signal processing, image processing, machine diagnosis and expert systems. V. I. Utkin (SU) described the state of "Discontinuous Control Systems" and included the different mathematical methods for analysis, sliding mode control, and different applications such as electrical drives and vehicles. Mrs. E. Gottzein (FRG) demonstrated "Control Challenges of Spaceplanes, Stations and Platforms", especially the future space flight development, systems engineering aspects, control problems and design approaches, simulation and validation requirements. The last plenary paper was presented by T. B. Sheridan (USA) on "Telerobotics". He started by explaining teleoperation, telepresence, robotics and telerobotics. The current status shows telerobotic applications in space, undersea, nuclear power, aids for the handicapped, surgery, mining, warehousing, firefighting, etc. Then the ongoing research was described, including supervisory control, meta-analysis of the man-machine interaction. Finally future developments were considered.

Technical Sessions and Case Studies

To obtain an overview over the distribution and presence of participants during the 10th IFAC World Congress, the number of persons attending each session was counted.

The statistics show that in sessions on APPLICATIONS IN TECHNICAL SYSTEMS the main interest was observed in manufacturing systems and robots, chemical systems, power systems and aerospace systems. With regard to various subjects, it was control, robust and adaptive control and design of automation systems that attracted the majority of participants. The average participation per session was rather large in chemical systems, in supervision and diagnosis, manual operation and robust and adaptive control and rather small in basic industry systems, multilevel control and measurement, filtering.

In the sessions on APPLICATIONS IN NONTECHNICAL SYSTEMS, most participants could be found in sessions on economic systems and social systems, especially with regard to analysis, modelling and control.

Within the THEORY OF AUTOMATIC CONTROL, priority was given to linear systems and non-linear systems. Among the subjects expert systems and artificial intelligence, adaptive control and identification proved to be the most attractive ones. The average participation per session was very large in education and tutorials, expert systems and artificial intelligence, adaptive control, large in robust control, adaptive control and identification and low in distributed parameter systems, multilevel systems and nonlinear control.

Discussion Sessions

The average participation in discussion sessions was quite good in technical systems and theory and comparable to that of the technical sessions. However, for nontechnical systems the average participation was remarkably lower.

The overall distribution of all sessions and participants shows that 54% of the participants were interested in Applications of Technical Systems, 6% in Applications of Nontechnical Systems, and 40% in the Theory of Automatic Control.

The average number of participants of all the sessions (except plenary papers) was 57. The theory-oriented sessions show the largest participation (61), followed by application-oriented sessions in technical systems (53) and in nontechnical systems (38).

IFAC Congress 1987
Best Applications Paper

As was published in issue no. 3/87 of the Newsletter, IFAC has established an IFAC Congress Applications Paper Prize in 1986. The Congress IPC was requested to select 3–8 candidates, and a selection committee was appointed by the IFAC President to select the prize winner on the spot in Munich. The number of accepted applications papers was about 300. The IPC was very happy about the large number of applications papers, but this made it almost impossible to reduce the number of candidates to the requested 3–8.

Therefore the IFAC Council decided not to award the prize in Munich and to work out a new selection procedure for this prize to be used for the next World Congress. The IFAC Council also decided to publish the list of all candidates selected by the Sub-IPCs of the IFAC Congress 1987.

CANDIDATES FOR THE APPLICATIONS PAPER PRIZE '87

Authors	Title
P. Baylou	Agricultural Robots
Z. Chen, J. C. Hung	Application of Quaternion in Robot Control
K. H. Clement, B. Tofbegard	A Data Acquisition and Control System Framework
K. H. Fasol, M. Pohl	Simulation and Controller Design for a Hydro-power Plant Verified by Field Tests – A Case Study
T. Higuchi, Y. Hojjat	Application of Electromagnetic Impulse Force to Precise Positioning
D. Hrovat, W. F. Powers	Power Train Computer Control Systems
D. Li, Y. Y. Haimes	A Hierarchical Generating Method with Feasible Decomposition
D. P. Looze, J. S. Freudenberg	Inherent Feedback Limitations for Distributed Systems
P. B. Luh, Y. C. Ho, Y. P. Zheng, J. M. Wu, Q. Y. Wang, L. Chen	Incentives in Production: A Case Study in Modelling and Control of Socio-economic Systems
A. Onishi	FUGI Part of a Global Early Warning System for National and International Conflicts
J. J. Rodden, H. J. Dougherty, D. S. Cormier	Flight Software Operation of the Hubble Space Telescope Fine Guidance Sensor
M. M. Saad, M. Duque, E. Irving	Thermal Process Robust Adaptive Control: An Experimental Evaluation
M. J. Shah	Process Optimization Using Intelligent Workstations in Distributed Control
M. Shibata, K. Hashimoto, M. Wahimoto	Application of Expert Systems for Blast Furnace Operation Control
S. Skogestad, M. Morari	Robust Control of Distillation Columns
H. G. Stassen	Supervisory Control and Rehabilitation. Are There Common Interests?
P. J. Thomas, T. A. Harrison, P. D. Hollywell	Using Advanced Control Techniques to Improve the Stability and Performance of a Nuclear Power Station Boiler
W. Thomas, B. C. Goodwin	Roll Eccentricity Control for Strip Rolling Mills
V. Wertz, B. Bastin, M. Haest	Identification of a Glass Tube Drawing Bench

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Season's Greetings to all our Readers

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Survey Papers

One novel feature of the IFAC Congress, i.e. to present survey papers in addition to the plenary papers and contributed papers turned out to be well accepted. Altogether 34 survey papers were given. The sessions with survey papers included constantly showed a very good participation over the whole week and resulted mostly in lively and substantial discussions.

The technical sessions with largest participation were (in brackets the approximate number of participants)

Expert Systems in On-Line Control	(400)
Adaptive Control Applications	(220)
Expert Systems for Diagnosis and Performance Monitoring	(200)
Use of AI-Methods in Control	(200)
Systems Identification Tutorials	(180)
Identification of Non-linear Systems	(150)
Control of Chemical Processes I	(150)
Adaptive Control Algorithms I	(150)
Robustness of Control Schemes II	(120)
Mobile Robots	(120)
Topics in Linear Systems Theory	(120)
Robustness of Adaptive Control Schemes	(120)
Robust Control Systems I	(120)

Two discussion sessions were especially attractive:

The Applications of Model Predictive Control	(130)
Robust Control	(120)

Hence, the audience was mainly interested to be informed in the new areas such as expert systems, artificial intelligence and areas with active current research, such as adaptive control, predictive control, identification, robust control and robotics control.

Moreover, those technical sessions where the IPC had made special efforts to promote the respective areas within IFAC were quite successful. Regarding for example the following subject areas, the average participation per session was:

Control of Cars and Engines	57
Automatic Control in Manufacturing	51
Robotics Control	78

We think that these (approximate) numbers are quite interesting and may be used for further planning.
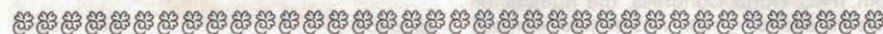
*) Editor's note:

The detailed tables will be published in the Proceedings of the 10th IFAC World Congress.

People and Papers

The final data on the 10th IFAC World Congress are now available. There was a total count of 1.432 participants from 46 countries. At the top of the list were the Federal Republic of Germany with 490 participants, the USA with 153 and Japan with 113. The other registrations ranged from 1 (Luxembourg, Mozambique, Chile, Iran, Saudi-Arabia, Thailand, Indonesia, Singapore and South Korea) to 65 (France). The accepted papers came from 39 countries, with the USA leading the list (114), followed by the FRG (87), Japan (68) and China (43).

Contributions of Technology to International Conflict Resolution
IFAC Workshop

Cleveland, Ohio, June 3–5, 1986

This Workshop attracted 46 engineers and scientists and specialists from many other disciplines to discuss the subject of "Contributions of Technology to International Conflict Resolution". A preprint volume with 31 papers was available to the participants and plans are under way with Pergamon Press to publish 23 papers as IFAC Proceedings.

Five Sessions took place on the following subjects:

1. Possible Causes for International Conflict — And Ways for Preventing Them from Becoming Wars.
2. Modeling as a Way of Describing National Processes.
3. Multiobjective, Multicriteria Systems Trade-Offs.
4. International Conflict Resolution Means.
5. Cooperative Security Systems — Closed-Loop Adaptive Control.

A sixth session was devoted to summary, conclusions, and recommendations.

This workshop was considered to be a successful one, and plans for two sessions on Improving International Stability at the 1987 IFAC Congress at Munich had been made. Consideration is being given to a possible Workshop related to the interests of the IFAC SWIIS Working Group to be held in 1988 and 1989.

Yacov Haimes, Chair NOC
Harold Chestnut, Chair IPC

The Emscom Working Group on Energy Systems Management and Economics
SCOPE

This Working Group is to enhance and promote mutual communication, exchange of ideas, and dissemination of research results in the areas of analysis, planning and management of large-scale energy systems, recognizing the international and interdisciplinary factors of policies, capital investment, technical development, regulation, economic/social effect, environmental impact, etc. Particular attention is to be given to:

— Perfection of supplies and demands,
— Long-range scenario and planning,
— Role of energy modeling in the national economy,
— Systems optimization and decision making,
— Methodology and technical tools for systems management,
— Economic, social and environmental effects of energy systems.

Planned activity:

The WG plans to hold a Workshop or Symposium on "Energy Systems Modeling, Management and Evaluation" (tentative) in Tokyo (Kyoto), Japan, in 1989.

Dynamics and Control of Chemical Reactors and Distillations
IFAC Symposium DYCORD '86
Bournemouth, U.K., December 8–10, 1986

In the chemical reactor area with the use of Kalman filtering to carry out online energy balances for monitoring, the progress of batch reactors was shown to be very powerful. For industrial reactors this was demonstrated by Schuler and de Haas, and for a laboratory reactor by D. Bonvin.

Another very notable paper was R. King's "Early detection of hazardous states in chemical reactors". King uses parallel Kalman filters to detect the presence of one or more hazardous situations, which could occur in highly exothermic chemical reactions and allow corrective actions to be taken.

In the distillation area, dynamic modelling gave rise to many discussions, particularly concerning the energy balance. Very slow transactions often observed during start-up were illustrated by McGreavy when effects caused by the heat capacity of the equipment were included.

So far interaction effects have been the main focus in the literature when various control system structures have been discussed. Recent experimental results obtained at Åbo by K. Waller show, however, that the way the secondary loops are closed can have a very strong effect on how the system is affected by disturbances, and that these effects can affect control quality much more than interactions. These results agree with results from extractive distillation presented by Retzbach from Stuttgart.

8 papers have been recommended for publication in Automatica.

7th School of Automatic Control in Mexico

In order to promote practical and theoretical aspects of automatic control in Mexico, the Mexican Association of Automatic Control (AMCA) together with the Institute of Electrical Research (IIE) organized the 7th School of Automatic Control in April 1987 in Cuernavaca City, Morelos. The School was sponsored by the IFAC Committee for the Support of Control Engineering Education in Developing Countries and co-sponsored by the AMCA and the IIE. The teachers were Prof. Huibert Kwakernaak of Enschede University and Prof. Theodore J. Williams of Purdue University. Specifically, Prof. T. J. Williams spoke about Industrial Computer Systems and Prof. H. Kwakernaak introduced the polynomial equation solution of the minimax frequency domain performance. In addition to the 16 hour lectures, a final discussion was organized. Printed material for the lectures was distributed to the audience. The programme was complemented by a technical visit to the simulator designed by the IIE of the Mexican nuclear plant Laguna Verde.

About 60 people attended the school, 40% of them were students of post-graduate level and 60% came from universities and research centres all over the country.

The IPC proposed the next DYCORD Symposium to be arranged in 1989 in Canada. The scope will be the same, but will be extended to Control of Batch Reactors.

The general result of the Technical Program was very satisfactory. Better instructions for younger authors might be relevant. Here it should be considered if a young author's prize would be a way to improve the oral presentation of these often unexperienced authors.

The subject "Dynamics and control of chemical reactors and distillation columns" is still most appropriate. Several new research installations and upgraded installations are now in place, thus further reports can be expected at the next DYCORD meeting.

Mogens Kümmel
DYCORD IPC-Chairman

New IIASA Director Appointed

Dr. Robert H. Pry has had an extensive career of technological, scientific, and managerial experience. Recently an executive and technical management consultant to business, government and universities, he has also been Founding President of the Center for Innovative Technology, and Adjunct Professor at the Massachusetts Institute of Technology; he was Vice Chairman (Technology) and Executive Vice President (R&D) at Gould Inc, and Vice President (R&D) at Combustion Engineering Inc. He has also been associated for many years with the General Electric Company, where he was responsible for R&D of materials and electronics sciences and engineering.

Dr. Pry is a member of numerous committees and boards, amongst others the Industrial Panel of the U.S. National Science Foundation, and a Fellow of the American Association for the Advancement of Science. He is author of many publications in the field of technology assessment and material science, and holder of five patents.

IFAC herewith extends its wholehearted welcome and best wishes to the new Director, looking forward to continuing the friendly relations and useful cooperation with its neighbour in Laxenburg.

"Man and Automation"
Fred Margulies
Memorial Workshop

Laxenburg, Austria, October 2, 1987

This Workshop was held on October 2, 1987, two days before Professor Fred Margulies would have celebrated his 70th birthday. Professor Margulies, who died so suddenly in February 1986, dedicated many years of his life to the problem of a humane working place. There were also two other aspects of major concern for him: Man should not become the slave of the machine and the use of new technologies should serve to give more space for the development and use of creative forces. It is in the spirit of these ideas and the representation of Fred Margulies' work within the framework of the IFAC TC on Social Effects (of which he was a founding member) that the topics were selected for the lectures in this workshop.

The Workshop was opened by Acad. T. Vamos (H), followed by a laudatio held by Prof. Leopold Schmetterer (A), Member of the Austrian Academy of Sciences, centering mainly on the personality of Fred Margulies. Professor Shuhei Aida (J) presented a "Concept of Eco-Technology", proposals for an EI (energy intelligent project) — in a new and highly promising area of research.

Professor Mike Cooley (GB), a long-time scientific and personal friend of Fred Margulies, then gave a highly interesting talk on the efforts made in the Greater London Area to create new and human centred work systems.

An overview of Technology Assessment in Austria was given by Norbert Rozsenich (A), director of the Research Department in the Federal Ministry of Science and Research. His talk focused on the efforts to promote the participation in international projects and the steps taken to further the development of new technologies in Austria.

Present and future tendencies with regard to automation and especially to microelectronics within Austrian Trade Unions were the topic of the lecture given by Paul Kolm (A). He was followed by one of the Austrian pioneers in digital computer science, Prof. Heinz Zemanek (A). His overview on data processing in Austria, entitled "Technology — Man — Society" (which had also been the title of a lecture Fred Margulies had held at the Technical University of Vienna, stressed the role the latter had played in this field of automatic control.

In his presentation "A New Time — A New Society" Tibor Vamos (H) also made clear the part Fred Margulies had played on the national and — later as Secretary — on the international level of IFAC.

Finally a panel discussion was held in the late afternoon with Michaela Moritz (A) and Peter Kopacek (A) as moderators. The panel consisted, among others, of Lena Martensson (S), Norbert Rozsenich (A) and Peter Fleissner (A).

The basic idea of this workshop was to give an overview on the social aspects of automatic control, a goal which was certainly achieved.

P. Kopacek

Papers from the Next Issue — January 1988

Papers

Control Parameterization: A Unified Approach to Optimal Control Problems with General Constraints
(C. J. Goh, K. L. Teo)

Estimation of Nitrogen Dioxide Concentrations in the Vicinity of a Roadway by Optimal Filtering Theory
(S. Omatu, J. H. Seinfeld, T. Soeda, Y. Sawaragi)

A Geometric Approach to Nonlinear Singularly Perturbed Control Systems
(R. Marino, P. V. Kokotovic)

Admissible MIMO Singular Observation LQG Designs
(Y. Halevi, Z. J. Palmor)

Hierarchical Multiobjective Analysis for Large-Scale Systems: Review and Current Status
(Y. Y. Haimes, D. Li)

Brief Papers

Observable Island Identification for State Estimation Using Incidence Matrix
(Y. H. Moon, Y. M. Park, K. J. Lee)

Stationary Optimal Control of Stochastically Sampled Continuous-Time Systems
(W. L. de Koning)

On the Design of Distributed Organizational Structures
(P. A. Remy, A. H. Levis, V. Y.-Y. Jin)

Calibration and Information in Expert Resolution: A Classical Approach
(R. Cooke, M. Mendel, W. Thijs)

Stabilization of Infinite Dimensional Systems with Periodic Feedback Gains and Sampled Output
(T.-J. Tarn, J. R. Zavgren Jr., X. Zeng)

On Optimality of Decentralized Control for a Class of Nonlinear Interconnected Systems
(A. Saberi)

An Optimal Feedback Regulation of Nonlinear Singularly Perturbed Systems Via Slow Manifold Approach
(K. Khorasani)

Technical Communiques

Book Reviews

Optimal Control by F. L. Lewis
(V. Kucera)

Control Systems Engineering by W. J. Palm
(S. Banks)

Control System Principles and Design by E. O. Doebelin
(G. C. Goodwin)

Competent Expert Systems: A Case Study in Fault Diagnosis by E. T. Keravnou and L. Johnson
(T. Vamos)

Modern Control Theory (2nd Edition) by W. L. Brogan
(J. Beyens)

Engineering Applications of Microcomputers Instrumentation and Control by R. Ball and R. Pratt
(H. Unbehauen)

WHO IS WHO IN IFAC

Ing. Vladimír Kučera, DrSc.
IFAC Council Member

Vladimír Kučera was born in Prague, Czechoslovakia in 1943. He studied at the Technical University of Prague, where he obtained the Ing. degree (Electrical Engineering) with distinction in 1966. Soon after, he joined the Czechoslovak Academy of Sciences, where he received the CSc. and DrSc. degrees (Control Theory) in 1970 and 1979, respectively.

Since 1967, Dr. Kučera has been with the Institute of Information Theory and Automation, one of the Institutes of the Czechoslovak Academy of Sciences in Prague. He held various research positions and currently is Deputy Director of the Institute.

Dr. Kučera held visiting positions at the National Research Council, Ottawa, Canada in 1970/71; at the Center for Mathematical System Theory, University of Florida, Gainesville, USA in 1977; at the Laboratoire d'Automatique, ENSM, Nantes, France in 1981/82; at the Research School of Physical Sciences, Australian National University, Canberra, Australia in 1984 and a number of short visiting appointments.

The research interests of Dr. Kučera include linear system theory, computer controlled systems, and process control. He contributed to the theory of the Riccati equation, to the design of deadbeat controllers, and he pioneered the use of Diophantine equations in the analysis and synthesis of linear multivariable control systems.

Dr. Kučera is the author of two books: Algebraic Theory of Discrete Linear Control (in Czech) (Academia, Prague, 1978) and Discrete Linear Control: The Polynomial Equation Approach (Wiley, Chichester, 1979). He has published some 130 research papers and reports and regularly presents his results at various scientific events.

Dr. Kučera is an Associate Editor of the IFAC Journal Automatica and serves on the editorial boards of Kybernetika and International Journal of Systems Science. He was a Sub-IPC-Member of the Colloquium on Structural Properties of Control Systems for the 9th IFAC World Congress in Budapest and the Sub-IPC-Chairman of the Subject Area on Linear Systems Theory for the 10th IFAC World Congress in Munich.

Dr. Kučera is a member of various professional societies and committees. He has been involved in IFAC for many years as a member of the Technical Committee on Theory. In 1987 he was elected ordinary member of the IFAC Council.