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## Changes in Automatica

A year ago several Editorial Staff changes were described. Now there is another major change. Dr. H. Austin Spang III, who has been evaluating papers in all fields of Control Applications (including computer control, software, computer aided control system design, as well as implementation and operational evaluation) for over 24 years, ever since Automatica became the IFAC Journal, wishes to retire as an Editor of Automatica at the end of 1993. Through these many years he has provided valuable contributions to Automatica and IFAC because well written papers on the application of control theory to real world problems are the ultimate goal of automatic control. Dr. Spang's service and experience will be missed. However, we are fortunate in that he has found a very well qualified Editor, who has been working with him as an Associate Editor for a number of years, to succeed him. This new editor is

Professor Yaman Arkun  
Georgia Institute of Technology  
School of Chemical Engineering  
778 Atlantic Drive  
Atlanta, GA 30332-0100  
USA

Therefore, effective immediately, papers in the areas of interest indicated above, must be sent directly to Professor Arkun for evaluation and possible publication in Automatica.

No papers should be sent to Dr. Spang - except revised papers which were previously evaluated by him. Note that he will continue to evaluate revised papers only through 1993.

Automatica Deputy-Editor-in-Chief, Huibert Kwakernaak, has been designated as the Liaison Officer with IFAC Meeting Organizers to assist them in selecting appropriate meeting papers for further review and possible publication in Automatica. In connection with this, he is also serving as an Advisory Editor to help guest editors of Special Issues establish publication schedules and guidelines and to assist them in preparing the issues for publication according to Automatica standards.

With these continuing changes and additions, we expect that Automatica will be even better prepared to meet future developments in the field of Automatic control and thereby provide increased service to IFAC and to the international control community.

George S. Axelby  
Editor-in-Chief  
Automatica

## Sydney Congress Approaching

Preparations are well in hand for the 12th IFAC World Congress to be held in Sydney, 18-23 July, 1993. Approximately 1700 papers were received and are currently being reviewed.

Judging from the reviews we have received to date, the papers are of an exceptionally high standard ranging from new theoretical results to innovative industrial applications.

Plenary addresses will be presented by Professor M. Araki (Kyoto University, Japan), Dr. William Powers (Ford Motor Company, USA), Dr. Mike Brisk (ICI Engineering, Australia), Professor Lennart Ljung (Linköping University, Sweden) and a joint address by Professors David Mayne and Lucien Pollack (University of California, USA).

Local arrangements are also progressing well with indications of a most exciting technical programme in Darling Harbour, Sydney, for 1993.

Graham C. Goodwin  
Co-IPC Chairman



**To all our readers**

**A Merry Christmas and a Healthy, Happy and Successful 1993**

## Dynamics and Control of Chemical Reactors, Distillation Columns and Batch Processes (DYCORD '92)

IFAC Symposium (3rd)  
College Park, MD, USA, 26-29 April, 1992

A call for abstracts of papers was distributed in the spring of 1991, with deadline 1 June, 1991. 103 abstracts were received and reviewed by 3-4 reviewers. 71 authors were accepted to send full papers around 25 August, 1991 with a deadline of 1 November, 1991. After the final selection, 61 papers remained to be presented at the Symposium and were printed in the preprints.

Four well-known international specialists in different fields were invited by the IPC to present survey papers on special topics. These were:

Prof. S. Skogestad (The Norwegian Institute of Technology, Norway)

Dynamics and Control on Distillation Columns  
Prof. B. Balakotaiah (University of Houston, USA)

Stability Criteria for Chemical Reactors

Prof. W. Harmon Ray (University of Wisconsin - Madison, USA)

Modeling and Control of Polymerization Reactors

Prof. T.F. Edgar (The University of Texas at Austin, USA)

Modeling and Control of Microelectronic Material Processing

Tutorials that are particularly important to process control engineers were presented by:  
Prof. Lennart Ljung (Linköping University, Sweden)

Process Identification, Theory and Practice  
Prof. Stephen A. Marcus (University of Maryland, USA)

Modeling and Control of Discrete Event Systems

Dr. David Smith, Jr. (El Dupont de Nemours&CO., USA) was the chairman and

moderator for a panel discussion on 'Industrial Control Challenges'. The Panel consisted of Dr. Jorge Mandler (Air Products & Chemicals Inc., USA)

Dr. Randy McFarlane (AMOCO Research Center, USA)

Dr. Lothar Lang (Bayer AG, Germany)

Dr. Babatunde Ogunnaike (Dupont, USA)

114 participants had registered for the meeting. In addition, graduate students from the University of Maryland participated in the meeting.

There were 18 technical sessions with 3-4 papers each. Each paper was given 30 minutes for the presentation including time for discussion.

Eight of the papers printed in the Preprints were not presented by the authors.

The scientific quality of the papers and their presentations were in general very high and the discussions following the papers were precise and interesting.

The Symposium took place at the Center for Adult Education of the University of Maryland, which both hosted the majority of the participants in its hotel section and offered the conference facilities, lunches and refreshments in an excellent way.

After the meeting, the Editors (J.G. Balchen, editor, E.D. Gilles, K. Waller, J.B. Rawlings, co-editors) selected the papers to be printed in the IFAC Proceedings. 52 ordinary papers and 4 survey papers were selected for the Proceedings.

Prof. J.G. Balchen, IPC Chairman

## Algorithms and Architectures for Real-Time Control

IFAC Workshop  
Seoul, South Korea

31 August - 2 September, 1992

Excellent Korean organization and hospitality combined to make this a memorable Workshop for all who attended. Sponsored by the IFAC TC on Computers, this Seoul event was the second in a series begun last year in Bangor, North Wales, UK. The meeting was only the second IFAC event to be held in South Korea and was organized by friendly and helpful workers at the Engineering Research Center for Advanced Control and Instrumentation at Seoul National University on behalf of the Korean Association of Automatic Control (KAAC).

The purpose of these Workshops is to explore new developments in real-time control resulting from advances in computing, both hardware and software. This Workshop series is a natural companion to the IFAC Workshop series in Real-Time Programming. From 187 papers submitted, 59 papers from 22 different countries were selected for the Final Program. These were presented in sessions covering Multiprocessor Systems, Fault-Tolerant Systems, Robot Control, Neural Networks, Filtering Algorithms, Parallel Algorithms, Identification, Control Algorithms, Fuzzy Control, Adaptive and Self-Tuning Control and Real-Time Control Applications.

In the first of four Keynote Papers, Wolfgang Halang, Germany, presented a paper provocatively titled "Contemporary Computers Considered Inappropriate for Real-Time Control". In his argument, he stressed the deficiencies of current systems and architectures with respect to predictable behaviour, data sampling, delays between sensing and actuation, simultaneous operation, timing and dependability. He also highlighted some misconceptions associated with real-time control along with bad practice and proposed an alternative view in this constructive talk.

Substituting for Peter Gawthrop, UK, who was unable to attend, IPC Chairman Peter Fleming, UK, described applications of "Transputers in Control". In this talk he demonstrated how new computing architectures, such as the transputer, were creating new opportunities leading to novel real-time control applications and algorithmic approaches.

George Irwin, UK, continued this theme by describing progress in algorithmic engineering and systolic algorithms, in particular. His paper on "Parallel Algorithms" used Kalman filtering as a unifying focus for the discussion. Besides the systolic approach, he also described the use of analogue flow diagrams for the derivation of appropriate parallel algorithms.

In the fourth Keynote Paper, Kang Geun, USA described his work of "Hard Deadlines in Real-Time Control Systems". This consisted of schemes for deriving hard deadlines, or maximum delays, for control systems and, in particular, focussed on linear time-invariant systems. He demonstrated how this work impacts strongly on fault tolerance and the handling of failures in real-time control systems.

Peter Fleming, IPC Chairman

## Economic Time Series Analysis and Systems Identification

IFAC Workshop  
Vienna, Austria, 1-3 July, 1992

This Workshop was organized to bring together researchers working in systems identification and time series analysis in a variety of different and partly completely separated disciplines including, in particular, engineering, econometrics and statistics, in order to improve communication and enhance cross fertilization. The idea was that mutual understanding and discussions, concerning basic ideas, theories, methods, software and applications may contribute to the further development of the subject.

The main topics at the conference were: New conceptual approaches to systems identification, systems identification from noisy data and errors-in-variables, time variable parameter modes, modelling and identification in the case of nonstationarity, the use of model reduction techniques in systems identification, cointegration, identification of long memory

systems, model selection procedures and last but not least applications.

Among the highlights I will only mention the survey lectures: J.C. Willems and R.E. Kalman gave lectures related to new conceptual approaches to systems identification. In the lecture by R. Dahlhaus and D. Findley, stochastic, modern "high technology" for modelling and identification of nonstationary processes and for model selection was presented. The lecture by M. Aoki demonstrated the use of modern state space modelling procedures for macroeconomic data.

There was a substantial amount also of partially controversial discussions: A good part of the discussions was related to basic concepts and paradigms used in different disciplines for system identification as well as to questions of relevance of theoretical results.

M. Deistler, IPC Chairman

# Artificial Intelligence in Real-Time Control

## IFAC/IFIP/IMACS Symposium

Delft, The Netherlands, 16-18 June, 1992

This Symposium is a continuation of a series of three successful workshops in this field (1988 Swansea, UK, 1989 Shenyang, PRC, 1991 Rohnert Park, CA, USA). It took place in Delft in the Department of Electrical Engineering on the campus of the Delft University of Technology. This event was selected and sponsored by the University as one of its lustrum activities in honour of the 150th anniversary of the University's establishment.

Out of the nearly 100 extended abstracts and draft papers submitted, 57 were accepted after review by the International Program Committee. We asked 12 colleagues to organize invited paper sessions. Their enthusiasm and reputation convinced many authors to submit a paper. Finally, 48 regular papers and 65 invited papers were accepted. Besides, the organizers were happy to schedule 5 plenary paper sessions. This brought the total number of contributions to 112, from which 103 were actually presented. It is regrettable that 9 papers could not be presented and discussed, as the authors could not come to Delft. However, the 92 % of the papers presented was a relatively good score.

In spite of the currently unfavourable economic conditions and the ever-growing number of symposia and workshops in this field and related areas, the attendance at the Symposium can be considered very good with 181 participants from 25 countries.

The preprints of the Symposium contain 112 contributions printed in one volume of 750 pages.

The Symposium intended to:

- investigate the state-of-the-art in the application of artificial intelligence techniques in real-time control
- bring together control system specialists, artificial intelligence specialists and end-users.

The main themes of the symposium were:

- The methodology of Artificial Intelligence Techniques in Control Engineering
  - \* Neural Net Control
  - \* Knowledge-Based Control
  - \* Fuzzy Control
  - \* Qualitative Reasoning
  - \* Fault Detection and Fault Diagnosis
  - \* Genetic Algorithms and Learning
- The Application of Artificial Intelligence Techniques in different areas of control
  - \* Process Control
  - \* Biotechnology
  - \* Robotics
  - \* Power Systems
- Hardware and Software Requirements
  - \* Temporal Reasoning
  - \* New Paradigms for Real-Time Control
  - \* Real-Time Environment for Intelligent Control

During the plenary sessions, well-known scientists highlighted topics of this fast developing area in control engineering and artificial intelligence.

The following plenary papers were presented

1. Autonomous Controllers  
Åström, K.J. (S)
2. Neural Networks for the Control of Dynamic Systems  
Narendra, K.S. (USA)

3. Toward Intelligent Control of Mechanical Processes  
Isermann, R (D)
4. Knowledge-Based Control:  
Selecting the Right Tool for the Job  
Leitch, R. (UK)
5. The Functional-Link Net Approach to the Learning of Real-Time Optimal Control  
Pao, Y.H. (USA)

The Program included 24 technical sessions, with three sessions taking place in parallel.

The following regular and invited paper sessions were scheduled:

Neural Network Schemes  
Knowledge Elicitation and Acquisition  
Applications of Fuzzy Control  
Temporal Reasoning  
Analysis and Design of Intelligent Controllers  
Applications of Neural Nets  
Process Monitoring and Supervision  
Fuzzy Control  
Learning and Control Schemes  
Direct and Supervisory Knowledge-Based Control  
New Paradigms for Real-Time Control  
Applications in Biotechnology  
Fault Detection and Fault Diagnosis  
Neural Nets and Simulation for Control  
Qualitative Reasoning  
Applications in Process Control  
Applications in Control and Measurement  
Genetic Algorithms and Learning  
Real-Time Environments for Intelligent Control  
Development of Real-Time AI Systems

About 35 % of the 103 papers presented reported on practical applications, 30 % dealt with theoretical aspects and 35 % had a mixed content of application-oriented and theoretical subjects.

The atmosphere at the conference was very stimulating and we had a very good attendance at the meetings with many discussions. The level of presentations was relatively high, and the material (transparencies and slides) prepared by the presenters was of high quality and generally in accordance with the instructions given to the authors.

Many of our professional engineers working in industry have the feeling that the gap between theory and practice in applying control and system theory in practice is widening rather than narrowing, despite so many years of developing control algorithms, which, however, are mainly based on linear system theory and extensive mathematical models.

In practice, many systems are partly unknown and highly nonlinear, and an increasing number of people confronted with real-life problems feel that the elegant road paved by linear system theory leads a number of applications to a dead end. Instead of a mathematical description, an alternative could be based on qualitative expressions and experience of those working with the process.

The Symposium clearly showed that there are alternative possibilities for control based on Artificial Intelligence Techniques. The audience had the feeling that this Symposium was the large scale breakthrough for Artificial Intelligence Techniques in Control Engineering.

In general, and according to the statements of many participants, this Symposium can be considered a very successful event.

The next event on the topic of AI in Real-Time Control is planned for Valencia, Spain, in 1994.

Prof.ir. H.B. Verbruggen  
NOC Chairman

## Support Systems for Decision and Negotiation Processes

### IFAC/IFORS/IIASA/TIMS Workshop

Warsaw, Poland  
24-26 June, 1992

The Workshop was the first sponsored by IFAC in this quickly developing area. The subject is an interdisciplinary one, particularly in terms of applications. That is why many organizations were willing to co-sponsor the event. The Workshop was organized by the Systems Research Institute, Polish Academy of Sciences. 91 papers were submitted to the organizers. After the reviewing process, 9 were rejected and some others sent back for revisions. As a result, 3 plenary and 13 technical sessions were organized. The plenary lectures were presented by Y.Y. Haimes 'Risk of Extreme Events and the Fallacy of the Expected Value'; R. Kulikowsky 'A Theory of Success with Application to Decision Support'; and W. Gaul 'Computer-Assisted Decision Support to Market Research and Marketing Problems'. The technical sessions comprised the following:

- Bargaining and Negotiation Analysis (5 papers)
- Negotiation and Mediation Support Systems (5)
- Negotiation and Conflict Resolution in Practice (6)
- Multi-Person Decision Making (4)
- Multi-Criteria Decision Making (5)
- Preferences, Opinions, and Consensus (4)
- Voting (4)
- Symbols, Concepts and Knowledge (5)
- Design of Decision Support Systems (5)
- Applications of Decision Support Systems (3)
- Decision Support Systems in Natural Resources and Ecology (5)
- Linguistic Information and Fuzzy Set Applications (1)
- Discrete Events and Intelligent Control (3)

All accepted papers were printed in a two-volume preprint set. A selection of extended papers will be published in special issues of the journals 'Annals of Operations Research' and 'Group Decision and Negotiation'. At the meeting of the IPC, the continuation of the Workshop was recommended.

R. Kulikowski, NOC Chairman

## Special Issue on Robust Control

Guest Editors: J. Ackermann, R.F. Curtain, P. Dorato, B.A. Francis, H. Kimura

### Introduction

(G.S. Axelby)

### Special Issue on Robust Control

(H. Kwakernaak)

In Memoriam: Kehni Wei (1946-1992)

(B.R. Barmish)

### Posthumous Paper

On the Connection Between Controllability and Stabilizability of Linear Systems with Structural Uncertain Parameters  
(T. Tsujino, T. Fujii, K. Wei)

### Invited Papers

A Survey of Extreme Point Results for Robustness of Control Systems  
(B.R. Barmish, H.I. Kang)

Controller Design for Plants with Structured Uncertainty  
(M.A. Dahieh, M.H. Khammash)

Mixed  $H_2/H_\infty$  Control for Discrete Time Systems via Convex Optimization  
(L. Kaminer, P.P. Khargonekar, M.A. Rotea)

The Complex Structured Singular Value  
(A. Packard, J. Doyle)

### Papers

A Fixed  $H_\infty$  Controller for a Supermanoeuvrable Fighter Performing the Herbst Manoeuvre  
(R.Y. Chiang, M.G. Safonov, K. Madden, J. Tekavy)

Robust Integrated Flight/Propulsion Control Design for a STOVI Aircraft Using  $H_\infty$  Control Design Techniques  
(S. Gaig)

Robust Roor Clustering for Linear Uncertain Systems Using Generalized Lyapunov Theory  
(R.K. Yedavalli)

Necessary and Sufficient Conditions for Robust Stability of Discrete Systems with Coefficients Depending Continuously on Two Interval Parameters  
(E. Zeheb)

## Automatic Control for Quality & Productivity ACQP'92

IFAC Workshop  
Istanbul, Turkey, 3-5 June, 1992

The quality, productivity and efficiency in industrial processes constitute the main issues of the production of goods and services. As a result of the political changes that occurred in the last few years and the economical globalization policies of the governments, today's highly competitive expanding markets accelerated the research in the implementation of automatic control engineering for quality and productivity.

The objective of the IFAC Workshop ACQP'92, held in Istanbul, was to present, discuss and communicate the research work done and the applications with respect to the issues mentioned above. The Workshop was sponsored by the IFAC TC on Developing Countries (DECOM), and co-sponsored by the IFAC TCs on Manufacturing Technology (MANTECH) and Education (EDCOM), and hosted by Istanbul Technical University; the local sponsors were the Scientific and Technical Research Council of Turkey (TUBITAK) and the Turkish National Committee of Automatic Control (TOK).

A total number of 108 participants from 21 different countries attended the Workshop. Prof. A. Kaya, Chairman of DECOM, and Chairman of the IPC, opened the meeting. 3 Plenary Sessions and 97 papers accepted out of the 120 submitted ones were presented. The 8 technical sessions were handled in 2 parallel sessions and dealt with the following topics: CIM, FMS, Statistical Quality Control, Statistical Production Control, Control Theory, Automation, Robotics, Identification and Estimation, Adaptive Control, Sensors, Control Applications and Production Systems.

Prof. A Talha Dinibütün, NOC Chairman

## Prof. George O. Striker 1913 - 1992

It is with great sadness that we inform the IFAC community of the death of Professor George O. Striker, Secretary General of the International Measurement Confederation, IMEKO, one of IFAC's sister federations. Professor Striker died on 29 September, 1992, at the age of 79.

By Professor Striker's untiring activity, the International Measurement Confederation has gradually become known in the world to organize attractive events in the area of measurement, instrument engineering and related fields.

### Impressum:

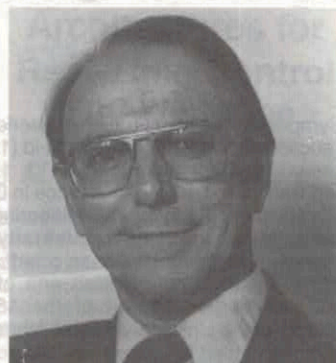
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## WHO IS WHO IN IFAC



Prof. M. Kümmel  
Chairman, TC on Applications

Mogens Kümmel was born in Copenhagen, Denmark on August 29, 1931. He graduated from the Technical University of Denmark in the field of Chemical Engineering in 1955. He then started in 1957 as assistant professor at the Department of Chemical Engineering. He spent the year 1963-64 at the Case Institute of Technology, Cleveland, Ohio, USA, and after that in 1965 became associate professor of Automatic Process Control. In 1989 he became professor at the Department of Chemical Engineering. He served the University from 1970 to 1975 as Dean of the Chemical Engineering Department and together with that period in 1977 to 1983 as Member of the Senate at the Technical University of Denmark.

Originally his research interest focussed on computer control of chemical processing equipment. In the early 80ies the emphasis was on geometric control, and in the later part of the 80ies on robust control of chemical processing equipment, particularly on distillation columns. Lately, the emphasis shifted to sewage water processes. To that end a major pilot plant was constructed with advanced measuring systems, data collection and computer control of the plant.

He has served in many different offices: 1973-78 he was Chairman of the Danish Automation Society. 1975 he was elected member of the Danish Academy of Technical Sciences. From 1982-90 he was a member of the Danish Technical Research Council and, in the same period, Chairman of this Council's Commission for Chemical Engineering Research. From 1985-90 he was a member of the Danish Council for Technology which is a body within the Ministry of Industry. From 1985-87 he was member of the Nordic Research Committee for Research Evaluation, and from 1986-88 President of the Nordic Research Committee.

Within the Danish Society for University Engineers he has been active in different offices: Chairman of the Chemical Engineering Section, Member of the Executive Board from 1972-73. President of the Society from 1977-81. Chairman of the Society's Council for Technical and Professional Activities 1984-87. From 1987-90 Vice-President in FEABI, i.e. the European Federation of National Engineering Associations.

Within IFAC, he was Editor of the IFAC Newsletter from 1976-80, and from 1981-86 Editor of book reviews for Automatica and also referee for Automatica. From 1983-85 Chairman of Control Professors in Western Europe. In 1983 he took over the Working Group on Chemical Process Control within APCOM and served as its Chairman until 1990. During that period, the Working Group developed a strong programme within Process Control. From 1984-90 he was Vice-Chairman of APCOM. He has served on many IPCs, including those for the Munich, Tallinn and Sydney IFAC World Congresses. He edited the proceedings from the Symposium on Adaptive Control of Chemical Processes in Bournemouth, UK in 1988. In the 1990-1993 triennial period, Prof. Kümmel serves as Chairman of the Applications Committee.

This Newsletter may be reproduced in whole or in part. We encourage reprinting in national and local automatic control periodicals. Acknowledgement to IFAC would be appreciated.