IFAC International Federation of Automatic Control

Newsletter

1999
No. 3
June

Contents:

The 14th IFAC World Congress
Beijing, 1999

Technical Board Chairman's Report

1. Introduction

This report covers the activities of the Technical Board from the 13th World Congress in San Francisco, 1996 to the 14th World Congress in Beijing, 1999.

This is a triennial report; the annual reports were presented at the Council and related meetings held in Fukuoka, 1997 and Nantes, 1998.

With the new structure of the Technical Board implemented, the emphasis was put on conceptual and operational issues and, of course, on the preparation of the technical program for the Congress.

2. The Field of Automatic Control

The field of automatic control is a discipline with a relatively short history and a rapid development. The areas of control design, computers in control, system identification, intelligent control, computer aided design, chemical process control, and manufacturing technology continued to enjoy the highest popularity. The most dynamically developing areas are those of nonlinear systems, automotive control, and agriculture. On the other hand, large scale systems, distributed systems, and distributed parameter systems suffered a slight loss of popularity in terms of IFAC affiliates.

During the triennium 1996-1999 the Technical Board addressed issues related to identification of emerging areas of control & automation and to IFAC's activities within these areas. The areas were listed in three categories: techniques and methods, applications, and supporting technologies. Within each of the three categories, further definitions related to the maturity of the topic were used: mature, active, and emerging topics. As a result of the efforts of the Technical Committees, Coordinating Committees and a task force of the Technical Board, an impressive list of several hundred topics was produced. Some topics, however, appear in several categories as they can be seen from different points of view by different groups of people. The list is being narrowed down to the most promising areas for IFAC's involvement in the future.

Due attention is paid to control engineering education. This vital field is promoted through technical meetings, awards, and publications.

3. Organization of the Technical Board

The work of the Technical Board is organized in 45 Technical Committees. The chairpersons of the Technical Committees are grouped in 9 Coordinating Committees. Each Coordinating Committee is chaired by one member of the Technical Board.

The Technical Board has two Vice-Chairmen, one who is responsible for organization, scopes, and communication between committees and the other one who is responsible for meeting approval, evaluation and quality control, and ten members. One member is a liaison to publications, and nine members chair the nine Coordinating Committees.

A list of the committees of the Technical Board and their chairpersons is regularly published in the IFAC Journals, which helps the control community to participate in IFAC activities.

4. Technical Meetings

One of the main responsibilites of the Technical Board is to identify the need for technical exchanges in certain fields and to solicit, sponsor, and evaluate the resulting technical meetings hosted by National Member Organizations.

Symposia, which represent a long term committment of IFAC, are included in the Master Plan (cf. page 4). There are 24 symposia on the list. One symposium, namely that of Adaptive Control and Signal Processing, was deleted from the Master Plan in 1998 for lack of interest. This topic area will be covered in the future by the System Identification Symposium and specialized workshops. One new symposium has been added: System Structure and Control. This event had

been organized twice as a workshop (1989, 1992) and twice as a conference (1995, 1998) before acquiring the status of a symposium.

The preparations for the symposia proceed smoothly: 13 symposia will take place in the year 2000, 5 symposia are approved for the year 2001, and 6 approvals for 2001 are pending. The Master Plan is available to all National Member organizations for proposals and better planning of IFAC events.

Proposals for conferences and workshops were approved by the Technical Board following the recommendations of the sponsoring Technical Committees. Events to be held during the congress year are submitted to the IFAC President for approval; two such approvals were given for 1999.

Of special importance are regional conferences, such as American, European, Asian, and Latin Amercian Control Conferences. These are organized in cooperation with IFAC, which includes coordination and publicity. In spite of mutual efforts, some conflicts of dates are hard to avoid.

In total, the following number of meetings were held during the triennium 1996–1999:

    24 symposia
     8 conferences
    29 workshops
    16 co-sponsored
     6 in cooperation

Further, 8 meetings were approved to be held in the rest of the year 1999, 29 have already been approved for the year 2000, and 10 for the year 2001.

The most active National Member Organizations in hosting technical meetings (time span 1980-1998) include USA, France, UK, Germany, Austria, Japan, and China.

No-show authors continue to be a problem for the organizers of technical meetings. By definition, a no-show author is one who fails to inform the organizers that he would be unable to participate. This is an ethical issue rather than material one.

5. Co-sponsorship of Meetings

In addition to proper technical meetings, IFAC co-sponsors other events, either as the main sponsor or as a co-sponsor of events primarily conducted by other organizations. In this way, IFAC increases the relationships with other organizations, opens to the control community complementary ways of collaboration, stimulates new topic areas and brings them within the scopes of Technical Committees, establishes new routes for individuals to publish in IFAC Journals, and promotes IFAC in other professional communitites.

The Technical Board prepared a revision of IFAC co-sponsorship rules and guidelines, to be approved by the Council. A simpler arrangement for co-sponsorship will exist for the so called „recognized organizations", to be proposed by the Technical Board, which should be non-profit international organizations dedicated to the promotion of science and technology, recognized for the quality of their events, whose technical goals complement those of IFAC.

The co-sponsorship rules will specify the IFAC participation conditions: at least one IFAC Technical Committee interested in the event, IFAC representatives serving as members of the program committee, approval of the NMO of the country in which the event is to take place, IFAC visibility on all printed materials, arrangements for publications in the IFAC Journals, and evaluation of the attendance fee and the registration arrangements.

6. Quality of Technical Meetings

The quality of IFAC technical meetings is monitored and evaluated by the Technical Board. The quality of technical papers is good, the production quality of the preprints is good or acceptable.

The decision taken in 1995 by the Technical Board, that paper submission for symposia and conferences be on a full draft paper basis, resulted in further improvement of quality of technical papers.

The quality analysis of IFAC symposia, included in the Master Plan, is particularly detailed and consists of three phases: information gathering, evaluation process, and evaluation report. The Technical Board approved the questionnaires and forms to be used for this purpose by the IPC and NOC chairpersons, the IFAC Journal editors and session chairs.

7. Technical and Coordinating Committees

The structure of the committees of the Technical Board is not considered to be fixed forever. An amount of overlap in the scopes of the existing committees or the need for new committees in emerging areas should call for changes.

The Technical Board in 1997 established principles for reducing overlapping interests among the Technical Committees. Each committee prepares its scope to define its areas of emphasis; these scopes are reviewed and updated regularly. Two committees are considered to have too much overlap if every event sponsored by either committee could logically be interpreted as a joint event.

The Technical Board also adopted procedures for forming, merging, or terminating Technical Committees. Formation of a new committee begins by submitting a petition to the Technical Board, initiated by a National Member Organization or a Technical/ Coordinating Committee chair. Mergers and terminations are decided by the Technical Board as part of the review of technical activities.

The Technical Board also defined and approved a methodology for selecting chairpersons for Technical Committees. The procedure starts by sending a request to all National Member Organizations and Coordinating Committee chairs for names of candidates. The Technical Board coordinates the selection of new chairs with the Election Committee to insure no conflicts are being created by candidate appointments. The outgoing as well as the incoming chairs are notified six months prior to the start of a new triennium to insure a smooth transition of committee operation.

Based on these rules, the following changes were made during the triennium 1996-1999. One technical committee was terminated (Control Terminology), one was merged (Cultural Aspects of Automation), two were renamed (Enterprise Integration, Developing Countries) and two new committees were formed (Linear Systems, Fuzzy and Neural Systems). Two coordinating committees were restructured and renamed (Life Support Systems, Global and Educational Issues of Automation). The chairman of one technical committee, T. J. Williams, resigned and P. Bernus was appointed new chairman. A forming of one new technical committee (Control in Emergencies) is prepared for approval of the incoming Technical Board.

8. World Congress

The Technical Board has been directly involved in the preparation of the technical program for the 14th IFAC World Congress in Beijing. These activities included the call for papers, call for workshops, call for invited sessions and panel discussions, program structure, and paper reviews by the Technical Committees.

The technical program of the Congress is organized in 9 tracks, each track corresponding to one coordinating committee of the Technical Board. Near 2200 papers from 68 countries and regions were submitted for inclusion in the program and 1560 were selected for presentation, either in lecture sessions or in poster sessions. There are 268 sessions, 17 running in parallel. The number of poster sessions is 50 and their popularity increases.

The Congress organization closely follows the successful congress in San Francisco. The entire proceedings will be available on a CD-ROM disk made available to each congress registrant along with a choice of 2 printed volumes out of 17. Each volume covers one track of parallel sessions. Tutorial workshops will precede the formal opening of the Congress. They will cover seven advanced topics and one industrial application. The congress awards will include the Quazza and Nichols Medals, Automatica Paper and Textbook Prizes, Young Author Prize, Application Paper Prize, and Poster Paper Prize.

9. Final Comments

The technical work of IFAC is based on its Technical Committees. In view of the number and diversity of the Technical Committees, the role of Coordinating Committees is essential. A training session for the new chair-

Control Engineering Practice

A Journal of IFAC the International Federation of Automatic Control

Papers from the April 1999 Issue

Real-time Control of Non-uniformity Sampled Systems
(P. Albertos and A. Crespo)
Active Sonar-based Bottom-following for Unmanned Underwater Vehicles
(M. Caccia, G. Bruzzone and G. Veruggio)
A Neuro-fuzzy Controller for a Stoked-fired Boiler, Based on Behavior Modeling
(W. Li and X. Chang)
A Model of Combustion Chambers, Including Nitrogen Oxide Generation, in Thermal Power Plants
(A. De Marco and G. Poncia)
Low-order Robust Attitude Control of an Earth Observation Satellite
(C. Valentin-Charbonnel, G. Duc and S.L. Ballois)
Real-time Midcourse Missile Guidance Robust against Launch Conditions
(E-J. Song and M.-J. Tahk)
Performance of Unstable Control Loops with Limits
(E. Eitelberg)
A Fuzzy PLC with Gain-scheduling Control Resolution for a Thermal Process – A Case Study
(H.-X. Li and S.K. Tso)
Transient Stability Improvement of Multi-machine Power Systems Using On-line Fuzzy Control of SMES
(S.M. Sadaghzadeh, M. Ehsan, N. Hadj Said and R. Feuillet)
A New Decentralized Controller Design Method with Application to Power-system Stabilizer Design
(T.C. Yang, J.H. Zhang and H. Yu)

Special Section on the Management and Control of Production and Logistics

Preface to the Special Section on the Management and Control of Production and Logistics
(Z. Binder, B.E. Hirsch and L.M. Aguilera)
Global Optimization of Energy and Production in Process Industries: A Genetic Algorithm Application
(A.Santos and A. Dourado)
Optimal Feedback Control Scheme Helping Managers to Adjust Aggregate Industrial Resources
(O.S. Silva Fo and S.D. Ventura)
Design of Machines and Robots Endowed with a Permanent Learning Ability
(D. Brun-Picard and J.S.S. Sousa)

IFAC Meeting Papers – Keyword Listing

On-line Fault Detection and Supervision in the Chemical Process Industries, Solaize, France, June 1998

Book Reviews
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Papers from the May 1999 Issue

Output-model-based Predictive Control of Unstable Combustion Systems Using Neural Networks
(G.P. Liu and S. Daley)
Experimental Verification of Stabilising Predictive Control
(P. Zelinka and B. Roha-Itkiv)
Intelligent Anti-skid Brake Controller Using a Neural Network
(R. Somakumar and J. Chandrasekhar)

A New PID Controller Tuning Method Based on Multiple Integrations
(D. Vrancic, Y. Peng and S. Strmcnik)
Defense Plans: Economic Solutions for Improving the Security of Power Systems
(M.P. Houry and O. Faucon)

Special Section on Algorithms and Architectures for Real-time Control

Preface to the Special Section on Algorithms and Architectures for Real-time Control
(D.F. Garcia Nocetti and P.J. Fleming)
Hardware-in-the-loop Simulation for the Design and Testing of Engine-control Systems
(R. Isermann, J. Schaffnit and S. Sinsel)
Distributed Aero-engine Control Systems Architecture Selection Using Multi-objective Optimisation
(H.A. Thompson, A.J. Chipperfield, P.J. Fleming and C. Legge)
Progressive Domain Focalization in Intelligent Control Systems
(R. Sanz, I. Alarcon, M. Segarra, J.A. Clavijo and A. de Antonio)
Biologically Inspired Fault-tolerant Architectures for Real-time Control Applications
(C. Ortega and A. Tyrell)
High-performance Computing for Real-time Spectral Estimation
(M.M. Madeira, S.J. Bellis, L.A. Aguilar Beltran, J.Solano Gonzalez, D.F. Garcia Nocetti, W.P. Marnane, M.P. Tokhi and M.G. Ruano)

IFAC Meeting Papers – Keyword Listing

Control Applications in Post-harvest Technology and Processing Technology, Budapest, Hungary, June 1998

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Reminder
Confirmation of Affiliate Membership

In the last issue of the IFAC Newsletter we asked you to confirm your Affiliate Membership by returning the questionnaire published in that issue.

Affiliate membership is free of charge and entitles you to the following benefits:

– The IFAC Newsletter (6 times per year)
– The IFAC Information Brochure (published once every three years)
– A reduced personal subscription rate for the IFAC journals (forms available upon request)
– Receipt of Calls for Papers in your fields of interest

If you wish to continue receiving the IFAC Newsletter you can confirm your affiliate membership by sending an e-mail to the IFAC Secretariat at the following e-mail address:

secr@ifac.co.at

Gusztav Hencsey
Newsletter Editor

IFAC General Assembly
to Convene in Beijing
July 5, 1999

The last General Assembly of this millenium will be convened in Bejing, China, P.R. in the framework of the 14th IFAC World Congress. On that occasion, representatives of IFAC's 49 National Member Organizations will get together to listen to progress reports from the various bodies of IFAC, to discuss them and to pave the way for a healthy further development of the Federation. Most importantly - the National Member Organizations will vote on the composition of the IFAC Council, the body vested with the day-to-day management of the Federation.

The IFAC Council, the Technical Board, the Executive Board and all other Technical and Executive Committees will also meet in Beijing - both in the old composition before the General Assembly and in their new composition after the General Assembly.

IFAC Awards
to be Presented in Beijing

The IFAC World Congress and all the related meetings of the Federation are an excellent opportunity for all control engineers to exchange ideas and to meet friends and colleagues from all over the world.

In the framework of the IFAC Congress also, several awards are presented. At the Opening Ceremony of the Congress on 5 July, the prestigious Quazza Medal and the equally prestigious Nichols Medal are awarded.

At the Closing Ceremony of the Congress on July 9, the Automatica Paper Prizes and the Control Engineering Practice Paper Prizes are awarded. In addition to that, the Applications Paper Prize winner and finalists are announced as are the winner and finalists of the Young Author Prize. What is particularly important about these awards is that the winners are not only determined from the written paper, but also from the quality of their presentation. This means a lot of work for the awarding committees, since they have to listen to all the paper presentations of Congress Award finalists in addition to giving their own papers and/or participating in administrative IFAC meetings.

Further, the Control Engineering Textbook Prize and the Poster Paper Prize will be awarded. Textbooks in control engineering are a very important tool in the development of the field and it is of utmost necessity that they are of excellent quality and continuously updated to be at the cutting edge of developments. A selection committee receives nominations for this prize long in advance of the Congress and selects a winner following careful deliberations.

Awarding the Poster Prize in turn, is a matter of on-the-spot evaluation of this fairly new form of paper presentation.

It will be a great pleasure to announce the finalists and winners of all awards in one of the next issues of the IFAC Newsletter.

Gusztav Hencsey, Newsletter Editor

Papers from the June 1999 Issue

Papers

Consistency of System Identification by Global
Total Least Squares
(C. Heij, W. Scherrer)
On the Choice of Inputs in Identification for
Robust Control
(A.C. Antoulas, B.D.O. Anderson)
High Performance Indirect Field-oriented Output-
feedback Control of Induction Motors
(S. Peresada, A. Tonielli, R. Morici)
Worst-case Conditional System Identification in a
General Class of Norms
(B. Kacewicz)
Symbolic Computation of Fisher Information
Matrices for Parametrized State-space Systems
(R.L.M. Peeters, B. Hanzon)

Brief Papers

Parameter Identification with Derivative Shift
Operator Parametrization
(L. Guo, M. Tomizuka)
Set-valued Methods for Linear Parameter Varying
Systems
(J.S. Shamma, D. Xiong)
On Exponential Stability of Nonlinear Time-varying
Differential Equations
(D. Aeyels, J. Peuteman)
On Combining Statistical and Set Theoretic
Estimation
(U.D. Hanebeck, J. Horn, G. Schmidt)
Combined Pole Placement/Sensitivity Function
Shaping Method Using Convex Optimization
Criteria
(J. Langer, I.D. Landau)
Analytical PID Parameter Expressions for Higher
Order Systems
(A.J. Isaksson, S.F. Graebe)
A Combined Backstepping and Small-gain
Approach to Adaptive Output Feedback Control
(Z-P. Jiang)

Technical Communiques

Output Overshoots in Systems with Integral
Action Operating in Sliding Mode
(R.J. Mantz, P.F. Puleston, H. De Battista)
Robust Stability and Stabilization of Linear Delayed
Systems with Structured Uncertainty
(Bohyung Lee, J.G. Lee)
An LMI Approach to Guaranteed Cost Control of
Linear Uncertain Time-delay Systems
(L. Yu, J. Chu)
Robust H(infinity) Observer Design of Linear State
Delayed Systems with Parametric Uncertainty: The
Discrete-time Case
(Z. Wang, B. Huang, H. Unbehauen)
H2-optimal Synthesis of Controllers with Relative
Degrees Two
(J.R. Corrado, W.M. Haddad, D.S. Bernstein)
A Note on Nonparametric Kernel Smoothing for
Model-free Fault Symptom Generation
(G. Fenu, T. Parisini)

Book Reviews

Advanced Control with MATLAB and SIMULINK,
Editors J. Moscinski and Z. Ogonowski
(A.Vanecek)
Modern Control Engineering, 3rd Edition, Editor
K. Ogata
(M. Indri)

Papers from the July 1999 Issue

Papers

Repetitive Control of MIMO Systems Using
H(infinite) Design
(G. Weiss, M. Häfele)
Fully Magnetic Attitude Control for Spacecraft
Subject to Gravity Gradient
(R. Wisniewski, M. Blanke)
Closed-loop Identification Revisited
(U. Forssell, L. Ljung)
Consistency and Asymptotic Normality of Some
Subspace Algorithms for Systems without
Observed Inputs
(D. Bauer, M. Deistler, W. Scherrer)
Strong Points of Weak Convergence: A Study
using RPA Gradient Estimation for Automatic
Learning
(F.J. Vazquez-Abad)

Brief Papers

Incremental Gain Analysis of Piecewise Linear
Systems and Application to the Antiwindup
Problem
(B.G. Romanchuk, M.C. Smith)
Input-to-state Stability of PD-controlled Robotic
Systems
(D. Angeli)
Robust Adaptive Identification of Slowly Time-
varying Parameters with Bounded Disturbances
(M. De Mathelin, R. Lozano)
Robust Regulation with Minimal Parametrization
for a Class of Nonlinear Systems
(G.L. Santosuosso)
Delay-dependent Robust H(infinite) Control of
Uncertain Linear State-delayed Systems
(C.E. De Souza, X. Li)
Square-root Information Filtering and Fixed-
interval Smoothing with Singularities
(M.L. Psiaki)

Book Reviews

Chain-scattering Approach to H(infinite)
Control, by Hidenori Kimura
(G. Meinsma)
Eigenstructure Assignment for Control System
Design, by G.P. Liu and R.J. Patton
(A. Ailon)
Sampling in Digital Signal Processing and
Control, by A. Feurer and G.C. Goodwin
(H. Fan)

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persons is organized during the Congress,
prepared by the Technical Board, to assist in
the smooth transition of operations and coor-
dination.

Over one thousand control scientists and
engineers have been involved in the Technical
Board activities through its various
committees. I trust that they find their
volunteer work for IFAC both challenging
and a rich source of satisfaction. I wish to
thank them all for being an essential part of
IFAC. I feel particularly honored to have been
able to serve IFAC in the capacity of
Technical Board Chairman for six years.

Prague, the 30th of March 1999.

Vladimir Kucera
TB Chairman

MASTER PLAN
OF IFAC SYMPOSIA

Titles (in alphabetical order)

Advanced Control in Chemical Processes
(ADCHEM)

Advances in Control Education (ACE)

Artificial Intelligence in Real Time Control

Automatic Control in Aerospace

Automated Systems Based on Human Skill and
Knowledge

Computer Aided Control Systems Design

Computational Methods in Economics, Finance
and Engineering-Economic Systems

Dynamics and Control of Process Systems
(DYCOPS)

Fault Detection, Supervision and Safety for
Technical Processes (SAFEPROCESS)

Information Control in Manufacturing (INCOM)

Intelligent Autonomous Vehicles (IAV)

Intelligent Components and Instruments for
Control Applications (SICICA)

Large Scale Systems: Theory and Applications

Low Cost Automation (LCA)

Man-Machine Systems (MMS)

Mining, Mineral and Metal Processing (MMM)

Modelling and Control of Biomedical Systems

Non-Linear Control Systems (NOLCOS)

Power Systems and Power Plants

Robot Control (SYROCO)

Robust Control Design (ROCOND)

System Identification (SYSID)

System Structure and Control

Transportation Systems