

Report of the IEEE CSS on CACSD

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Here is a summary of the activities of the TC during the second semester of 2006.

*** Meetings ***

We organized two meetings of the TC:

- a first one in July in Toulouse during the IFAC Symposium on Robust Control Design (ROCOND) jointly with the IFAC Technical Committee on Control Design (chaired by Patrizio Colaneri) and the IFAC Technical Committee on Robust Control (chaired by Carsten Scherer)

- a second one in October in Munich during the joint IEEE Conference on Control Applications (CCA), Symposium on Computer-Aided Control System Design (CACSD) and International Symposium on Intelligent Control (ISIC).

*** Software developments ***

The control team in Thessaloniki, Greece (including Antonis Vardulakis and Nikos Karampetakis from the AG group on symbolic methods) has recently signed a contract with Wolfram Research and the Greek Government for the production of an add-on package for Descriptor Systems for the package Control System Professional of Mathematica.

A graphical user interface for the Polynomial Toolbox for Matlab (produced by PolyX, Ltd) has been created in Matlab by Dimitris Varsamis and Nikos Karampetakis.

The Release 5.0 of the SLICOT Library for control theory computations, posted on the Web sites www.slicot.org and www.slicot.de, has been updated by Vasile Sima (AG on numerics).

Ivan Markovsky (AG on numerical methods in the behavioral setting) informed us that a new version of the Behavioral Toolbox has been released:
<http://www.math.rug.nl/~trentelman/jacob/BTB/download.html> by Ricardo Zavala Yoe, Harry Trentelman, and Kees Praagman.

Herman Mann (AG on multidisciplinary system simulation) updated the web-based course on dynamics of multidisciplinary controlled systems and added new modules to it. The collection of interactive virtual experiments was also updated with various controlled systems. Finally, a blended e-learning course on simulation and control was prepared for engineers of the Czech industry.

Giuseppe Calafiore and Fabrizio Dabbene (AG on probabilistic and randomized methods in control) are involved in the preparation of a Matlab Randomized Algorithms Control Toolbox. The Toolbox is being developed by A. Tremba, P. Shcherbakov, E. Grazyna, B.T. Polyak (Russian Academy of Science-RAS) and F. Dabbene, G. Calafiore, R. Tempo (National Research Council of Italy -CNR) under a cooperation project between RAS and CNR. A first release is expected for summer 2007.

*** Conference activities ***

Oscar Gonzalez, the General Chair of the IEEE CSS MSC (Multiconference on Systems and Control) which will take place in 2008 in the United States, is seeking a CACSD Programme Chair and a CACSD Invited Session Chair to organize

CACSD-related tracks during the conference. Nominations will be approved during the BoG meeting of the CDC 2006.

Giuseppe Calafiore and Fabrizio Dabbene organized an invited session on Probabilistic and Randomized Algorithms at IFAC ROCOND 2006.

Giuseppe Calafiore organized a session on Probabilistic and Randomized Methods for Robust Design at EURO 06, the European Conference on Operational Research, Iceland, July 2006

Nikos Karampetakis and Antonis Vardulakis organized an invited session on symbolic methods at the IEEE CACSD 2006. Several invited sessions are planned for the European Control Conference, Kos, Greece, July 2007.

Vasile Sima organized the invited session "Advances in numerical algorithms for robust control and its applications", at the IFAC ROCOND 2006. He also co-organized (with Daniel Kressner) the invited session "Robust numerical methods for control" at the IEEE CACSD 2006.

Paolo Rapisara (AG on numerical methods in the behavioral setting) organized three invited sessions (behavioral system theory; control, estimation, and identification in a behavioral setting; functional and algebraic methods in behavioral systems and control theory) during the International Symposium on Mathematical Theory of Networks and Systems in Kyoto, Japan, July 2006. The minicourse "Recent developments in behavioral system theory" was given by Paolo Rapisarda and Jan C. Willems at this conference.

An International Workshop on Total Least Squares and Errors-in-Variables Modeling was organized by Sabine Van Huffel and Ivan Markovsky. It took place in Leuven, Belgium in August 2006 and brought together 54 participants from 15 different countries working in diverse scientific disciplines: numerical analysis, statistics, optimization, signal processing, systems and control, computer algebra, and computer vision. Papers presented during the workshop as well as contributed papers will appear in special issues of Computational Statistics & Data Analysis and Signal Processing.

<http://homes.esat.kuleuven.be/~imarkovs/workshop.html>

Herman Mann organized an invited session on modeling and simulation of multidisciplinary systems at IEEE CACSD 2006.

*** Journals, books ***

Giuseppe Calafiore and Fabrizio Dabbene edited the book "Probabilistic and Randomized Methods for Design under Uncertainty" released by Springer-Verlag, London in 2006, see <http://www.springer.com/sgw/cda/frontpage/0,11855,1-156-22-52501991-0,00.html>

Nikos Karampetakis and Antonis Vardulakis edited a Special Issue of the International Journal of Control (Vol.79, No11, November 2006) on the Use of Computer Algebra Systems for Computer Aided Control System Design. The issue consists of the following peer-reviewed papers:

1. M. C. de Oliveira and J. William Helton (USA), Computer Algebra Tailored to Matrix Inequalities in Control.
2. M. D. Lutovac and D. V. Tosic, Symbolic design of control systems using Mathematica.
3. G. Jovanovic Dolecek and S. K. Mitra, Using MATLAB Symbolic Toolbox for the Sensitivity Analysis of IIR Digital Filters.
4. S. Hecker, A. Varga, Symbolic manipulation techniques for low order LFT-based parametric uncertainty modeling.

5. M. Turan Soylemez and Ilker Ustoglu, Designing Control Systems using exact and symbolic manipulations of formulae.
6. N. Kracaniyas, M. Mitrouli and D. Triantafyllou, Matrix Pencil methodologies for computing the greatest common divisor of polynomials: Hybrid algorithms and their performance.
7. X. Zheng, A.C. Zolotas, and H. Wang, Mathematica Implementation of Output-Feedback Pole Assignment for Uncertain Systems via Symbolic Algebra.
8. A.M. Perdon, M. Anderlucchi and M. Caboara, Efficient algorithms for geometric control of systems over rings.
9. Claude-Pierre Jeannerod and Gilles Villard, Asymptotically fast polynomial matrix algorithms for multivariable systems.
10. Jinsong Liang and YangQuan Chen, Hybrid Symbolic and Numerical Simulation Studies of Time-fractional Order Wave-Diffusion Systems.
11. Hirokazu Anai and Shinji Hara, A parameter space approach to fixed-order robust controller synthesis by quantifier elimination.
12. Xinmin Liu, Zongli Lin, Ben M. Chen, Symbolic Realization of Asymptotic Time-Scale and Eigenstructure, Assignment Design Method in Multivariable Control.
13. Ioannis A. Fotiou, Philipp Rostalski, Pablo A. Parrilo and Manfred Morari, Parametric Optimization and Optimal Control using Algebraic Geometry.

Ivan Markovsky is a guest editor, together with Sabine Van Huffel, Richard J. Vaccaro, and Torsten Soderstrom, for a special issue of Signal Processing on "Total Least Squares and Errors-in-Variables Modeling". This special issue collects selected papers presented at the International Workshop 2006 on Total Least Squares and Errors-in-Variables Modeling as well as contributed papers.

*** Focus ***

A new AG on "Probabilistic and Randomized Methods in Control" was started in 2005 by Fabrizio Dabbene and Giuseppe Calafiore.

A webpage collecting information and news about randomized algorithms and stochastic optimization methods for the analysis and control of dynamic systems, with special focus on the computational aspects, is now available. The webpage is hosted by Politecnico di Torino, Torino, Italy. The link is:

<http://staff.polito.it/fabrizio.dabbene/CACSD/>.

A full bibliography in BibTeX format is available for free download at the above link. The .bib file collects more than references relevant to the fields of Randomized Algorithms for Control, Stochastic Optimization, Statistical Learning and Robust Control.