Michel Malabre; Christian Commault; Jean-Michel Dion; Claude H. Moog; Petr Zagalak
Guest editorial introduction to the special issue on System Structure and Control

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GUEST EDITORIAL INTRODUCTION TO THE SPECIAL ISSUE ON SYSTEM STRUCTURE AND CONTROL

MICHEL MALABRE, CHRISTIAN COMMAULT, JEAN-MICHEL DION, CLAUDE MOOG AND PETR ZAGALAK

1. INTRODUCTION

This issue is based on a selection of papers presented in invited sessions at the First IFAC Symposium on System Structure and Control held in Prague, 29–31 August 2001. The roots of this Symposium go back to the IFAC Workshops and Conferences on System Structure and Control that were held in Prague in 1989 and 1992, and in Nantes in 1995 and 1998. This series of meetings reflects the activity in the field of System Structure and Control, with most recent contributions to follow.

2. ISSUE CONTENT

The content of this special issue which covers linear, nonlinear and optimization problems is as follows.

Six papers deal with theoretical aspects concerning analysis and control design of linear systems:

— C. Commault, J.-M. Dion and J. van der Woude give graph theoretic characterizations of invariants of structured systems.

— N. Karcanias and K. G. Vafiadis consider the problem of selection of physical inputs and outputs such as the resulting system satisfies some required properties (*).

— F. Kraffer and P. Zagalak study the parametrization of proper compensators via polynomial matrix equations.

— S. Mondié, M. Dambrine and O. Santos analyse the closed loop stability properties of systems when using approximations of control laws that include distributed delays.

— J. Ruiz-León, J. A. Torres-Muñoz and F. Lizaola present a solution to the decoupling problem with stability when using non regular state feedback.

— F. Rotella, F. Carrillo and M. Ayadi use the flatness view point for polynomial pole placement design.

Four papers focus on nonlinear situations:

— R. K. Pearson, U. Kotta and S. Nõmm introduce a class of nonlinear discrete-time dynamic models and demonstrate that these models have classical state space realizations.

— R. Pothin, C. H. Moog and X. Xia highlight the role of the rank of a differential one-form in solving disturbance decoupling problems.

— J. F. Pommaret uses the methods of "algebraic analysis" to extend poles and zeros concepts to nonlinear control systems.

— M. Voicu and O. Pastravanu construct a general solution in L^2 for Popov's frequency-domain inequality revealing interesting time-domain properties.

Three papers consider optimization issues:

— J.-F. Camart, B. del-Muro-Cuéllar and M. Malabre characterize fixed poles of H_2 optimal control by measurement feedback.

— D. Henrion, K. Sagimoto and M. Šebek adress the robust stability problem of polynomial matrices and yield tractable sufficient LMI conditions.

— G. Marro, D. Prattichizzo and E. Zattoni present an algorithmic framework for the solution of H_2 optimal decoupling of previewed or mesurable signals (*).

(*) Due to space limitations these papers are published in other issues of the journal. The paper by Marro et al appeared in volume 38 (2002), number 4 while the paper by Karcanias and Vafiades will appear in volume 38 (2002), number 6.

Prof. Dr. Christian Commault and Prof. Dr. Jean-Michel Dion, Laboratoire d'Automatique de Grenoble (UMR CNRS 5528), ENSIEG, BP 46, 38402, Saint Martin d'Hères. France.
e-mail: commault, dion@inpg.fr

Prof. Dr. Michel Malabre and Prof. Dr. Claude Moog, IRCCyN (UMR CNRS 6597), Ecole Centrale de Nantes, 1, Rue de la Noë, BP 92101, 44321 Nantes Cedex 3. France.
e-mail: Michel.Malabre, Claude.Moog@irccyn.ec-nantes.fr

Dr. Petr Zagalak, Institute of Information Theory and Automation, Academy of Sciences of the Czech Republic, P.O. Box 18, 182 08 Praha 8. Czech Republic.
e-mail: zagalak@utia.cas.cz