BOOK REVIEW:

Systems and Control in the Twenty-First Century, **C.I. Byrnes, B.N. Datta, D.S. Gilliam, C.F. Martin** (Editors), Progress in Systems and Control Theory, vol. 22, Birkhäuser Verlag, Boston – Basel – Berlin 1997, x+434 pag., ISBN 0–8176–3881–4.

The mathematical theory of networks and systems has a long and interesting history with roots in analysis, design and synthesis of electrical and mechanical systems. The underlying techinques are diverse and ranging from matrix theory, linear algebra, operator theory to nonlinear analysis. Fundamental problems such as state-space realizations of input/output systems, or the use of feedback to prescribe the behaviour of a closed-loop system have remained under investigation since the beginning of the theory.

The volume under review gathers articles presented as plenary addresses, invited addresses and minisymposia at the 12th International Symposium on the Mathematical Theory of Networks and Systems, held in St. Louis, Missouri from June 24 to June 28, 1996. These articles are written by outstanding researchers in systems, control and estimation.

D. Alpay and I. Gohberg: State Space Method for Inverse Spectral Problems;

B.D.O. Anderson: New Developments in the Theory of Positive Systems;

H.G. Banks and N. Lybeck: Modeling Methodology for Elastomer Dynamics;

D. Boley and B.N. Datta: Numerical Methods for Linear Control Systems;

R. Brockett: Notes on Stochastic Processes on Manifolds;

C.I. Byrnes and A. Lindquist: On Duality between Filtering and Interpolation;

M. Fliess, J. Levine, P. Martin, F. Olivier, and P. Rouchon: Controlling Nonlinear Systems by Flatness;

H. Frankowska: How Set-Valued Maps Pop Up in Control Theory;

R.W. Freund: Circuit Simulation Techniques Based on Lanczos-Type Algorithms;

B.K. Ghosh, E.P. Loucks, C.F. Martin and L. Schovanec: Dynamical Systems Approach to Target Motion Perception and Ocular Motion Control;

U. Helmke and K. Hüper: The Jacobi Method: A Tool for Computation and Control;

A.B. Kurzhanski: Ellipsoidal Calculus for Estimation and Feedback Control;

I. Lasiecka: Control and Stabilization of Interactive Structures;

S.I. Marcus, E. Fernández-Gaucherand, D. Hernández-Hernández, S. Coraluppi, and P. Fard: Risk Sensitive Markov Decision Processes;

Y.M. Ram: On Inverse Spectral Problems and Pole-Zero Assignment;

J. Rosenthal and X.A. Wang: Inverse Eigenvalue Problems for Multivariable Linear Systems;

R. Sepulchre, M. Janković, and P.V. Kokotović: Recursive Designs and Feedback Passivation;

A. Srivastava, M.I. Miller, and U. Grenander: Ergodic Algorithms on Special Euclidean Groups for ATR;

H.J. Sussmann: Some Recent Results on the Maximum Principle of Optimal Control Theory;

A.R. Teel: Nonlinear Input-Output Stability and Stabilization;

G. Weiss: Repetitive Control Systems: Old and New Ideas;

J.C. Willems: Fitting Data Sequences to Linear Systems;

K.A. Wise: Fighter Aircraft Control Challenges and Technology Transition.

The articles in this collection present new approaches and mathematical methods in distributed parameter systems, linear, nonlinear systems and stochastic systems, for solving problems in areas such as aircraft design, circuit simulation, imaging, speech synthesis and visionics. On the other hand, one of the declared aim of this volume is to show "the resilience to change of mathematical methods" in systems theory. It is also remarkable for the models and methods drawn from biology, computing and material science and it proves to be a valuable reference to graduate students and researchers in areas of engineering and mathematics with an interest in analysis, design and synthesis of circuits and systems.

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