

PREFACE

On 1 - 3 September 1994 in Międzyzdroje, Poland, the First International Symposium on Mathematical Models in Automation and Robotics (MMAR'94) was held and organized by the Institute of Control Engineering of the Technical University of Szczecin and co-sponsored by the Committee of Automation and Robotics, Committee of Metrology and Instrumentation and Commission of Cybernetics of the Polish Academy of Sciences.

Now, through the courtesy of Prof. Józef Korbicz, the Editor-in-Chief of Applied Mathematics and Computer Science (AMCS), an opportunity has arisen to present the readers of AMCS with the most interesting, in our opinion, papers in their extended forms, selected from among eighty presented at MMAR'94 and published in the Symposium proceedings. The selected papers illustrate current trends in such areas as control of multidimensional and infinite-dimensional systems and their controllability, observability and stabilizability, modern automatic control techniques, computer-aided design techniques for multivariable systems, control of discrete systems and problems of modelling. To give the readers an insight into this special issue of AMCS we briefly review below the contents of the papers.

D. Owens, N. Amann and E. Rogers discuss recent results in an important and promising area of Iterative Learning Control. Due attention is given to several important aspects as robustness of learning, convergence conditions, convergence types and limitations. T. Kaczorek derives in his paper a solution and the general response formula for the regular general type model of 2-D continuous-discrete linear systems with delays and solves the minimum energy control of the regular model. J. Klamka studies the concept of constrained approximate for linear stationary abstract retarded dynamical systems defined in infinite-dimensional Hilbert spaces. Using the methods taken from the spectral theory of linear unbounded operators the necessary and sufficient conditions for constrained approximate relative controllability are formulated and proved in his paper. E.K. Boukas, A. Świerniak and H. Yang discuss the problem of design of decentralized controllers for the class of interconnected linear systems with Markovian jumping parameters and unknown but structured uncertainties. In the paper of Z. Bartosiewicz a setting for studying controllability and stabilizability of partially defined systems is given. Some results known for globally defined systems are transferred to this more general setting, some are shown to be not valid for partially defined systems. The paper of S. Bańka is devoted to the synthesis of multipurpose control systems for linear MIMO discrete time models of plants defined by proper right-invertible

rational transfer matrices. The considered control systems simultaneously ensure complete dynamic decoupling, arbitrary closed-loop pole placement and steady-state output rejection of the deterministic part of disturbances and zero steady-state regulation (or tracking) errors. The paper of D. Franke deals with finite state machines which provide suitable mathematical models for discrete-event dynamical systems. The technique introduced here allows one to detect a closer relationship between discrete-event systems and classical discrete-time systems. K. Latawiec examines in his paper mean-deviational and incremental formulations of the familiar adaptive control algorithms, incorporating the recursive LS estimator coupled with different optimal single-step controllers. Z. Emirsajlow and S. Townley consider two minimum energy control problems for an uncertain linear infinite-dimensional systems with a bounded input operator. They present a new approach to computing estimates for the deviation of the final state of the perturbed system from the final state of the unperturbed system. In the paper of W. Krajewski, A. Lepschy and V. Viaro properties of model reduction techniques based on the retention of first- and second-order information are discussed. Additionally, the paper of T. Wey and F. Svaricek is included that takes up an interesting subject of disturbance decoupling in non-linear structured systems. We hope the papers will be of interest to the readers of AMCS giving them also an idea of the profile and standard of MMAR'94.

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