POLISH ACADEMY OF SCIENCES SYSTEMS RESEARCH INSTITUTE

# control and cybernetics

WARSZAWA  $\bullet\,2007 \bullet \text{QUARTERLY} \bullet \text{VOL}.$  36  $\bullet$  No. 1

This journal is edited and published by the Systems Research Institute of the Polish Academy of Sciences. Its main objective is to stimulate the development of broadly conceived systems theory and analysis.

The field of interest covers general concepts, theories, methods and techniques associated with analysis, modelling, control and management in various systems (e.g. technological, economic, ecological, social).

The journal is particularly interested in results in the following areas of research:

### Systems and control theory

- General systems theory
- Optimal control
- Optimization theory
- Optimization algorithms
- Decomposition and coordination methods
- Structural optimization
- Data analysis and learning
- Modelling and identification
- Game theory and polioptimization
- Decision and negotiation systems
- Stochastic and fuzzy systems

### Systems control and management

- Systems analysis of national and regional development
- Modelling and control of complex systems (in energy, water, industry, agriculture)
- Applications of operations research methods
- Computer aided management, control and optimal design
- Methodological aspects of applications of control and systems methods

Quarterly journal CONTROL AND CYBERNETICS is being indexed in the following  $ISI^{\mbox{\sc B}}$  products:  $SciSearch^{\mbox{\sc B}}$ ,  $Research \ Alert^{\mbox{\sc B}}$ ,  $CompuMath \ Citation \ Index^{\mbox{\sc B}}$ , and  $Current \ Contents^{\mbox{\sc B}}/Engineering$ ,  $Computing \ {\sc S}$  Technology. Reviews of individual papers from CONTROL AND CYBERNETICS appear also in International Abstracts in Operations Research, Mathematical Reviews and Zentralblatt für Mathematik. Abstracted in Applied Mechanical Reviews.

We hope that CONTROL AND CYBERNETICS will contribute to the development of systems and control sciences and will stimulate and encourage applications of systems approach in different areas.

> © Systems Research Institute, Polish Academy of Sciences

# Control and Cybernetics

vol. **36** (2007) No. 1

## CONTENTS

<ul> <li>N. P. OSMOLOVSKII, H. MAURER: Equivalence of second order optimality conditions for bang-bang control problems. Part 2: Proofs, variational derivatives and representations</li> </ul>	5
T. KACZOREK: Realization problem for singular positive continuous-time systems with delays	47
TL. CHIEN, CHCH. CHEN, CHJ. WU, YCH. HUANG, CH Y. CHEN: Tracking and disturbance rejection in a nonlinear control system with time delay	59
H. ROUHANI, A. SADEGHZADEH, C. LUCAS, B. N. ARAABI: Emotional learning based intelligent speed and position control applied to neurofuzzy model of switched reluctance motor	75
P. J. SUCHOMSKI: A reliable synthesis of discrete-time $\mathcal{H}_{\infty}$ control. Part I: basic theorems and J-lossless conjugators	97
A. AYBAR: Decentralized structural control approach for Petri nets	143
T. ANTCZAK: Second order convexity and a modified objective function method in mathematical programming	161
J. BŁAŻEWICZ, P. ŁUKASIK, S. WILK: New machine learning methods for prediction of protein secondary structures	183

M. BASU, S. SINHA: An inflationary inventory model with time dependent demand with Weibull distribution deterioration and partial backlogging under permissible delay in payments	203
E. KORCZAK: New formula for the failure/repair frequency of multi-state monotone systems and its applications	219
R. MOTYKA: Sudden death testing versus traditional censored life testing. A Monte Carlo study	241 >-
L. USTINOVICHIUS, E. K. ZAVADKAS, V. PODVEZKO: Application of a quantitative multiple criteria decision making (MCDM-1) approach to the analysis of investments in construc- tion	251
Book reviews	
K. Tchoń: "Current Trends in Nonlinear Systems and Control" by L. Menini, L. Zaccarian and Ch.T. Abdallah, eds.	269