Preface

Since the late 1980s technical diagnostics has been an area of major scientific interest and serious research. It covers many established and emerging topics in control and systems engineering, robotics, aerospace, applied mathematics and statistics, decision sciences, signal processing, and artificial intelligence, to mention only a few of the most widely recognized. The developments have been followed by a great number of applications of fault diagnosis methods in both industrial and medical areas. Certainly, the increasing complexity of automation and systems, and the need to ensure the highest level of reliability and safety require continuing research and the development of innovative approaches to fault diagnosis, including fault-tolerant, and reconfigurable control.

This book contains selected papers presented at the 12th International Conference on Diagnostics of Processes and Systems (DPS), held in Ustka, Poland, from 6 to 9 September 2015. The conference was organized by the Gdańsk University of Technology, Faculty of Electronics, Telecommunications and Informatics, Dept. of Robotics and Decision Systems, with the support of the University of Zielona Góra and the Warsaw University of Technology.


The main subject matter of the DPS conference series is related to the demands of research and industrial centers for diagnostics, monitoring, and decision-making systems. DPS welcomes combinations of domains of engineering knowledge for diagnosis, including detection, isolation, localization, identification, diagnostics, reconfiguration, and control. The conference is open to new challenges, including medical and industrial diagnosis, computer systems diagnosis, and non-industrial applications, providing a forum for exchanging experience and for sharing solutions between the academic and industrial communities.
There are thus six principal topics of DPS interests: (i) Fault detection, isolation and identification; (ii) Fault-tolerant control systems; (iii) Process safety, quality and reliability; and (iv) Medical diagnostics; as well as (v) methodologies based on mathematical modeling, parameter identification and state estimation, qualitative models, statistical and signal processing, artificial intelligence, fuzzy logic and rough sets, expert systems, neural networks; and (vi) industrial applications of diagnostic systems in fault tolerant problems, safety, monitoring and alarming, quality control, computer systems and networks, diagnostic software, software reliability, medicine and therapy, environment protection, production control, and other industries, chemistry, electronics, and power systems, etc.

The subject area of the DPS conferences corresponds to the topic of the IFAC symposia on Fault Detection, Supervision and Safety for Technical Processes (SAFEPROCESS), as well as to the newly established international conferences on Control and Fault-Tolerant Systems.

The book is divided into six parts:

Part I  Fault Detection and Isolation
Part II  Estimation and Identification
Part III Robust and Fault Tolerant Control
Part IV Industrial and Medical Diagnostics
Part V  Artificial Intelligence
Part VI Expert and Computer Systems.

I wish to thank all participants, and reviewers from the International Program Committee for their scientific and personal contribution to the conference.

My particular appreciation goes to the authors of the papers published in this collective book of Springer and the other book of PWNT Gdańsk, as well as to the plenary speakers for delivering their lectures:

- Henrik Niemann, Technical University of Denmark: *Fault Diagnosis by using Modification of the Feedback Controller*
- Michał Bartyś, Warsaw University of Technology: *Diagnosing Single and Multiple Faults from FDI Perspective*
- Paolo Castaldi, Nicola Mimmo, Silvio Simani, Universities of Bologna and Ferrara: *Issues of Fault Diagnosis and Fault Tolerant Control for Aero-space Systems*
- Philippe Weber and Didier Theilliol, University of Lorraine: *Bayesian Networks Application to the Dependability of Multi-State Systems*
- Youmin Zhang, Concordia University: *Challenges and Development on Fault Diagnosis and Fault-Tolerant Cooperative Control Techniques with Applications to Unmanned Systems.*
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