Preface

The growing complexity of many modern systems and equipment increases considerably the reliability, availability and safety demands. The growing demands for fault-tolerance encourage industry to look for new methods and techniques for detecting and diagnosing process abnormalities. Presently, several methods and strategies are being developed to solve these tasks. This issue of the Journal is devoted to the presentation of more traditional analytical redundancy (model-based) methods and knowledge-based approaches using information associated with heuristic reasoning. The main goal of this issue is to give an overview of the state-of-the-art, present new research results and to show future developments in this interdisciplinary field. An emphasis is given on theoretical aspects of known and new methods and algorithms although some applications are considered as well. Here, results and achievements of international community are presented, but special attention is given to contribution of the Polish researchers to fault detection and isolation theory.

The present volume consists of fourteen papers which focus to a large extent on fault detection and isolation techniques that are based on the use of mathematical models (Frank and Ding; Tanaka; Bradatsch *et al.*; Kaźmierczak; Batko and Banek; Natke and Yao; Cempel; Będkowski and Dąbrowski; Kościelny) and knowledge-based models (Banaszak and Kuś; Cholewa; Korbicz *et al.*; Michalski) of a process system. Patton and Chen provide a tutorial discussion of the different problems in robustness and survey the state of the art in robust solutions for quantitative model-based fault diagnosis.

We belive the issue to be timely since researches from different fields (control theory, applied mathematics, computer science, artificial intelligence, applied mechanics) have recently shown strong interest in this topic. It is proved by the fact that at recent conferences (Baden-Baden, Germany, Sept. 10–13, 1991; Newark, Delaware, USA, April 22–24, 1992), it was common to have several hundred people in the audience whenever the topic was discussed. Finally, we hope the wide scope of this issue will also be of value in the educational establishments as a source of useful library reference information.

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