

Wolfgang Borutzky *Editor*

Bond Graphs for Modelling, Control and Fault Diagnosis of Engineering Systems

Second Edition

 Springer

Bond Graph Model Based Fault Diagnosis Of Hybrid Systems

Wolfgang Borutzky



Bond Graph Model Based Fault Diagnosis Of Hybrid Systems:

Bond Graph Model-based Fault Diagnosis of Hybrid Systems Wolfgang Borutzky, 2014-11-04 This book presents bond graph model based fault detection with a focus on hybrid system models The book addresses model design simulation control and model based fault diagnosis of multidisciplinary engineering systems The text begins with a brief survey of the state of the art then focuses on hybrid systems The author then uses different bond graph approaches throughout the text and provides case studies

Bond Graph Modelling for Control, Fault Diagnosis and Failure Prognosis Wolfgang Borutzky, 2020-12-17 This book shows in a comprehensive presentation how Bond Graph methodology can support model based control model based fault diagnosis fault accommodation and failure prognosis by reviewing the state of the art presenting a hybrid integrated approach to Bond Graph model based fault diagnosis and failure prognosis and by providing a review of software that can be used for these tasks The structured text illustrates on numerous small examples how the computational structure superimposed on an acausal bond graph can be exploited to check for control properties such as structural observability and control lability perform parameter estimation and fault detection and isolation provide discrete values of an unknown degradation trend at sample points and develop an inverse model for fault accommodation The comprehensive presentation also covers failure prognosis based on continuous state estimation by means of filters or time series forecasting This book has been written for students specializing in the overlap of engineering and computer science as well as for researchers and for engineers in industry working with modelling simulation control fault diagnosis and failure prognosis in various application fields and who might be interested to see how bond graph modelling can support their work Presents a hybrid model based data driven approach to failure prognosis Highlights synergies and relations between fault diagnosis and failure prognostic Discusses the importance of fault diagnosis and failure prognostic in various fields

Bond Graphs for Modelling, Control and Fault Diagnosis of Engineering Systems Wolfgang Borutzky, 2016-12-31 This book presents theory and latest application work in Bond Graph methodology with a focus on Hybrid dynamical system models Model based fault diagnosis model based fault tolerant control fault prognosis and also addresses Open thermodynamic systems with compressible fluid flow Distributed parameter models of mechanical subsystems In addition the book covers various applications of current interest ranging from motorised wheelchairs in vivo surgery robots walking machines to wind turbines The up to date presentation has been made possible by experts who are active members of the worldwide bond graph modelling community This book is the completely revised 2nd edition of the 2011 Springer compilation text titled Bond Graph Modelling of Engineering Systems Theory Applications and Software Support It extends the presentation of theory and applications of graph methodology by new developments and latest research results Like the first edition this book addresses readers in academia as well as practitioners in industry and invites experts in related fields to consider the potential and the state of the art of bond graph modelling

Model-based Health Monitoring of Hybrid Systems Danwei Wang, Ming Yu, Chang

Boon Low,Shai Arogeti,2013-05-23 This book systematically presents a comprehensive framework and effective techniques for in depth analysis clear design procedure and efficient implementation of diagnosis and prognosis algorithms for hybrid systems It offers an overview of the fundamentals of diagnosis prognosis and hybrid bond graph modeling This book also describes hybrid bond graph based quantitative fault detection isolation and estimation Moreover it also presents strategies to track the system mode and predict the remaining useful life under multiple fault condition A real world complex hybrid system a vehicle steering control system is studied using the developed fault diagnosis methods to show practical significance Readers of this book will benefit from easy to understand fundamentals of bond graph models concepts of health monitoring fault diagnosis and failure prognosis as well as hybrid systems The reader will gain knowledge of fault detection and isolation in complex systems including those with hybrid nature and will learn state of the art developments in theory and technologies of fault diagnosis and failure prognosis for complex systems *Fault Diagnosis of Hybrid Dynamic and Complex Systems*

Moamar Sayed-Mouchaweh,2018-03-27 Online fault diagnosis is crucial to ensure safe operation of complex dynamic systems in spite of faults affecting the system behaviors Consequences of the occurrence of faults can be severe and result in human casualties environmentally harmful emissions high repair costs and economical losses caused by unexpected stops in production lines The majority of real systems are hybrid dynamic systems HDS In HDS the dynamical behaviors evolve continuously with time according to the discrete mode configuration in which the system is Consequently fault diagnosis approaches must take into account both discrete and continuous dynamics as well as the interactions between them in order to perform correct fault diagnosis This book presents recent and advanced approaches and techniques that address the complex problem of fault diagnosis of hybrid dynamic and complex systems using different model based and data driven approaches in different application domains inductor motors chemical process formed by tanks reactors and valves ignition engine sewer networks mobile robots planetary rover prototype etc These approaches cover the different aspects of performing single multiple online offline parametric discrete abrupt tear and wear fault diagnosis in incremental non incremental manner using different modeling tools hybrid automata hybrid Petri nets hybrid bond graphs extended Kalman filter etc for different classes of hybrid dynamic and complex systems *Safety and Reliability - Safe Societies in a Changing World*

Stein Haugen,Anne Barros,Coen van Gulijk,Trond Kongsvik,Jan Erik Vinnem,2018-06-15 Safety and Reliability Safe Societies in a Changing World collects the papers presented at the 28th European Safety and Reliability Conference ESREL 2018 in Trondheim Norway June 17 21 2018 The contributions cover a wide range of methodologies and application areas for safety and reliability that contribute to safe societies in a changing world These methodologies and applications include foundations of risk and reliability assessment and management mathematical methods in reliability and safety risk assessment risk management system reliability uncertainty analysis digitalization and big data prognostics and system health management occupational safety accident and incident modeling maintenance modeling and applications

simulation for safety and reliability analysis dynamic risk and barrier management organizational factors and safety culture human factors and human reliability resilience engineering structural reliability natural hazards security economic analysis in risk management Safety and Reliability Safe Societies in a Changing World will be invaluable to academics and professionals working in a wide range of industrial and governmental sectors offshore oil and gas nuclear engineering aeronautics and aerospace marine transport and engineering railways road transport automotive engineering civil engineering critical infrastructures electrical and electronic engineering energy production and distribution environmental engineering information technology and telecommunications insurance and finance manufacturing marine transport mechanical engineering security and protection and policy making

Model-based Diagnosis of Hybrid Systems Sriram Narasimhan, 2002 **Proceedings of the 2001 International Conference on Bond Graph Modeling and Simulation (ICBGM '01), Phoenix, Arizona, Crowne Plaza Hotel, January 7-11, 2001** José Joaquin Granda, G. Dauphin-Tanguy, 2001

The Proceedings of the 2003 International Conference on Bond Graph Modeling and Simulation (ICBGM 2003), Orlando, Florida, Marriott Orlando Airport, January 19-23, 2003 Society for Modeling and Simulation International, 2002 **Proceedings of the ... IEEE Instrumentation and Measurement Technology Conference**, 2003

IJCAI, 2003 *IJCAI-03* International Joint Conferences on Artificial Intelligence, Mexican Society for Artificial Intelligence, 2003 *Fault Diagnosis of Dynamic Systems* Teresa Escobet, Anibal Bregon, Belarmino Pulido, Vicenç Puig, 2019-06-22 Fault Diagnosis of Dynamic Systems provides readers with a glimpse into the fundamental issues and techniques of fault diagnosis used by Automatic Control FDI and Artificial Intelligence DX research communities The book reviews the standard techniques and approaches widely used in both communities It also contains benchmark examples and case studies that demonstrate how the same problem can be solved using the presented approaches The book also introduces advanced fault diagnosis approaches that are currently still being researched including methods for non linear hybrid discrete event and software business systems as well as an introduction to prognosis Fault Diagnosis of Dynamic Systems is valuable source of information for researchers and engineers starting to work on fault diagnosis and willing to have a reference guide on the main concepts and standard approaches on fault diagnosis Readers with experience on one of the two main communities will also find it useful to learn the fundamental concepts of the other community and the synergies between them The book is also open to researchers or academics who are already familiar with the standard approaches since they will find a collection of advanced approaches with more specific and advanced topics or with application to different domains Finally engineers and researchers looking for transferable fault diagnosis methods will also find useful insights in the book *Hybrid Systems : Computation and Control*, 2001 *Modular Diagnostics of Computer-controlled Machine Tools and Mechatronic Systems* Byung-Kwon Min, 1999 *Dissertation Abstracts International*, 2008

Proceedings, 2004 **International Aerospace Abstracts**, 1998 *Artificial Intelligence*, 2000 *On-line Fault*

Detection and Supervision in the Chemical Process Industries, 1995 A. J. Morris, E. B. Martin, 1996 Paperback These proceedings contain the papers from the IFAC Workshop on On Line Fault Detection and Supervision in the Chemical Process Industries held in Newcastle upon Tyne UK 12-13 June 1995. The Workshop provided an ideal forum for academic and industrial researchers to discuss their experience and research results in this field. Topics covered included Multivariate Methods, Neural Network Approaches, Supervision, Control, Diagnosis, Expert Systems, Learning, Dependable Systems, Performance, Fault Detection, Model Based Systems and Applications.

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