



Bond Graph Model-based Fault Diagnosis of Hybrid Systems

By Wolfgang Borutzky

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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.

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Editorial Review

From the Back Cover

This book presents a bond graph model-based approach to fault diagnosis in mechatronic systems appropriately represented by a hybrid model. The book begins by giving a survey of the fundamentals of fault diagnosis and failure prognosis, then recalls state-of-art developments referring to latest publications, and goes on to discuss various bond graph representations of hybrid system models, equations formulation for switched systems, and simulation of their dynamic behavior.

The structured text:

- focuses on bond graph model-based fault detection and isolation in hybrid systems;
- addresses isolation of multiple parametric faults in hybrid systems;
- considers system mode identification;
- provides a number of elaborated case studies that consider fault scenarios for switched power electronic systems commonly used in a variety of applications; and
- indicates that bond graph modelling can also be used for failure prognosis.

In order to facilitate the understanding of fault diagnosis and the presented bond graph model-based approach to fault diagnosis in hybrid systems, three appendices cover the required notions, definitions, a short introduction into bond graph modelling, and some mathematical background.

Bond Graph Model-based Fault Diagnosis in Hybrid Systems may be used in courses on fault diagnosis, as a supplementary text for advanced courses in modelling, simulation, and control, as well as for self-studies and as a reference. It has been designed to serve readers in academia and in industry concerned with fault diagnosis who might be interested to see how a graphical methodology such as bond graph modelling can support quantitative model-based fault diagnosis of engineering systems represented by a hybrid model.

About the Author

Dr. Borutzky is a Professor of Modelling, Simulation and Visualisation of Engineering Systems at Bonn-Rhein-Sieg University of Applied Sciences.

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