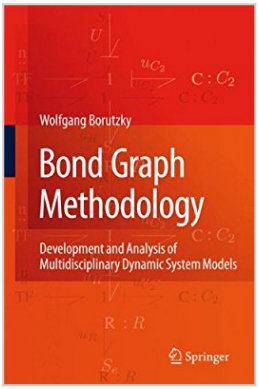

Bond Graph Methodology: Development and Analysis of Multidisciplinary Dynamic System Models

By Wolfgang Borutzky

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Nowadays, engineering systems are of ever-increasing complexity and must be c- sidered asmultidisciplinary systems composed of interacting subsystems or system components from different engineering disciplines. Thus, an integration of various engineering disciplines, e.g, mechanical, electrical and control engineering in ac- current design approach is required. With regard to the systematic development and analysis of system models,interdisciplinary computer aided methodologies are - coming more and more important. A graphical description formalism particularly suited for multidisciplinary s- tems arebondgraphs devised by Professor Henry Paynter in as early as 1959 at the Massachusetts Institute of Technology (MIT) in Cambridge, Massachusetts, USA and in use since then all over the world. This monograph is devoted exclusively to the bond graph methodology. It gives a comprehensive, in-depth, state-of-the-art presentation including recent results sc- tered over research articles and dissertations and research contributions by the - thor to a number of topics. The book systematically covers the fundamentals of developing bond graphs and deriving mathematical models from them, the recent developments in meth- ology, symbolic and numerical processing of mathematical models derived from bond graphs. Additionally it discusses modern modelling languages, the paradigm of object-oriented modelling, modern software that can be used for building and for processing of bond graph models, and provides a chapter with small case studies illustrating various applications of the methodology.

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Editorial Review

From the Back Cover

Nowadays, engineering systems are becoming increasingly complex and, for design purposes, must be considered as multidisciplinary systems made up of components from different engineering disciplines. With regard to the systematic development and the analysis of models, interdisciplinary methodologies supported by software become more and more important. Bond graphs are a graphical description formalism particularly suited for multidisciplinary systems and used by modellers across the world.

Bond Graph Methodology gives a comprehensive, in-depth representation of the state of the art, including recent results gathered from research articles, dissertations and contributions by the author on a number of topics. The structured and rigorous presentation systematically covers model development, analysis of models, numerical computation of models and modern software that can be used for a bond graph approach. The book also includes a range of case studies illustrating various applications of the methodology and provides a glossary.

Bond Graph Methodology addresses fundamentals, as well as advanced topics, e.g., models of variable structure, bond graphs for sensitivity analysis and generation of equations for the study of robustness. The compilation and presentation of the material has been inspired by the author's extensive experience in research and teaching.

A useful text for advanced courses in modelling, simulation and control, *Bond Graph Methodology* can also be used for self-study. It has been designed to serve readers interested in the subject of bond graph modelling and those with expertise in related areas, as well as members of the worldwide community of bond graph modellers.

About the Author
Dr Wolfgang Borutzky is a professor of modelling and simulation of engineering systems at Bonn-Rhein-Sieg University of Applied Sciences. He is a member of ASIM, the simulation society of Austria, Germany and Switzerland, and has contributed refereed papers to international conferences; notably the International Conference on Bond Graph Modelling and Simulation.

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