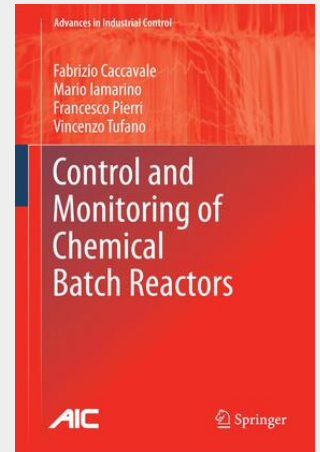


Control and Monitoring of Chemical Batch Reactors

The Chemical Batch Reactor is aimed at tackling the above problems from a blending of academic and industrial perspectives. Advanced solutions (i.e., those based on recent research results) to the four fundamental problems of modeling, identification, control and fault diagnosis for batch processes are developed in detail in four distinct chapters. In each chapter, a general overview of foundational concepts is also given, together with a review of recent and classical literature on the various subjects. To provide a unitary treatment of the different topics and give a firm link to the underlying practical applications, a single case study is developed as the book progresses; a batch process of industrial interest, i.e., the phenol-formaldehyde reaction for the production of phenolic resins, is adopted to test the various techniques developed. In this way, a roadmap of the solutions to fundamental problems, ranging from the early stages of the production process to the complete design of control and diagnosis systems, is provided for both industrial practitioners and academic researchers.

Methodological and technological problems related to batch chemical reactors are often very challenging and require contributions from experts in several disciplines (chemistry, chemical engineering, materials science, control engineering, measurement and sensing). A number of problems have to be tackled when dealing with batch reactors in industrial applications, ranging from design and planning of the plant to scheduling, optimization and performance achievement of batch operations. In order to meet such requirements, some fundamental issues need to be faced: modeling of the reactor and of the process, identification of the parameters in the mathematical models, control of the variables characterizing the process and early diagnosis of failures. Control and Monitoring of Chemical Batch Reactors is aimed at tackling the above problems from a blending of academic and industrial perspectives. Advanced solutions (i.e., those based on recent research results) to the fundamental problems of modeling, identification, control and fault diagnosis for batch processes are developed in detail in distinct chapters. In each chapter, a general overview of foundational concepts is also given, together with a review of recent and classical literature on the various subjects. To provide a unitary treatment of the different topics and give a firm link to the underlying practical applications, a single case study is developed through the course of the book. Namely, a batch process of industrial interest, i.e., the phenol-formaldehyde reaction, is adopted to test the proposed techniques. In this way, a roadmap for the development of control and diagnosis systems is provided, ranging from the early stages of the production process to the complete design of control and diagnosis systems. Hence, the book is directed to both industrial practitioners and academic researchers, although it is also suitable for adoption in advanced post-graduate level courses focused on process control, control applications and nonlinear control. Advances in Industrial Control aims to report and encourage the transfer of technology in control engineering. The rapid development of control technology has an impact on all areas of the control discipline. The series offers an opportunity for researchers to present an extended exposition of new work in all aspects of industrial control.



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