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Nota di contenuto	CHEMICAL REACTOR DESIGN AND CONTROL; CONTENTS; PREFACE; 1 REACTOR BASICS; 1.1 Fundamentals of Kinetics and Reaction Equilibrium; 1.1.1 Power-Law Kinetics; 1.1.2 Heterogeneous Reaction Kinetics; 1.1.3 Biochemical Reaction Kinetics; 1.1.4 Literature; 1.2 Multiple Reactions; 1.2.1 Parallel Reactions; 1.2.2 Series Reactions; 1.3 Determining Kinetic Parameters; 1.4 Types and Fundamental Properties of Reactors; 1.4.1 Continuous Stirred-Tank Reactor; 1.4.2 Batch Reactor; 1.4.3 Tubular Plug Flow Reactor; 1.5 Heat Transfer in Reactors; 1.6 Reactor ScaleUp; 1.7 Conclusion 2.8.1 Simulation Setup 2.8.2 Specifying Reactions; 2.8.3 Reactor Setup; 2.9 Optimization of CSTR Systems; 2.9.1 Economics of Series CSTRs; 2.9.2 Economics of a Reactor-Column Process; 2.9.3 CSTR Processes with Two Reactants; 2.10 Conclusion; 3 CONTROL OF CSTR SYSTEMS; 3.1 Irreversible, Single Reactant; 3.1.1 Nonlinear Dynamic Model; 3.1.2

Linear Model; 3.1.3 Effect of Conversion on Openloop and Closedloop Stability; 3.1.4 Nonlinear Dynamic Simulation; 3.1.5 Effect of Jacket Volume; 3.1.6 Cooling Coil; 3.1.7 External Heat Exchanger; 3.1.8 Comparison of CSTR-in-Series Processes
3.1.9 Dynamics of Reactor-Stripper Process
3.2 Reactor-Column Process with Two Reactants; 3.2.1 Nonlinear Dynamic Model of Reactor and Column; 3.2.2 Control Structure for Reactor-Column Process; 3.2.3 Reactor-Column Process with Hot Reaction; 3.3 AutoRefrigerated Reactor Control; 3.3.1 Dynamic Model; 3.3.2 Simulation Results; 3.4 Reactor Temperature Control Using Feed Manipulation; 3.4.1 Introduction; 3.4.2 Revised Control Structure; 3.4.3 Results; 3.4.4 Valve Position Control; 3.5 Aspen Dynamics Simulation of CSTRs; 3.5.1 Setting up the Dynamic Simulation
3.5.2 Running the Simulation and Tuning Controllers
3.5.3 Results with Several Heat Transfer Options; 3.5.4 Use of RGIBBS Reactor; 3.6 Conclusion; 4 CONTROL OF BATCH REACTORS; 4.1 Irreversible, Single Reactant; 4.1.1 Pure Batch Reactor; 4.1.2 Fed-Batch Reactor; 4.2 Batch Reactor with Two Reactants; 4.3 Batch Reactor with Consecutive Reactions; 4.4 Aspen Plus Simulation Using RBatch; 4.5 Ethanol Batch Fermentor; 4.6 Fed-Batch Hydrogenation Reactor; 4.7 Batch TML Reactor; 4.8 Fed-Batch Reactor with Multiple Reactions; 4.8.1 Equations; 4.8.2 Effect of Feed Trajectory on Conversion and Selectivity
4.8.3 Batch Optimization

Sommario/riassunto

Chemical Reactor Design and Control uses process simulators like Matlab®, Aspen Plus, and Aspen Dynamics to study the design of chemical reactors and their dynamic control. There are numerous books that focus on steady-state reactor design. There are no books that consider practical control systems for real industrial reactors. This unique reference addresses the simultaneous design and control of chemical reactors. After a discussion of reactor basics, it: Covers three types of classical reactors: continuous stirred tank (CSTR), batch, and tubular plug flow Emphasizes tempe
