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Nota di contenuto	Modeling, Analysis and Optimization of Process and Energy Systems; Contents; Preface; Conversion Factors; List of Symbols; Chapter 1: Introduction to Energy Usage, Cost, and Efficiency; 1.1 ENERGY UTILIZATION IN THE UNITED STATES; 1.2 THE COST OF ENERGY; 1.3 ENERGY EFFICIENCY; 1.4 THE COST OF SELF-GENERATED VERSUS PURCHASED ELECTRICITY; 1.5 THE COST OF FUEL AND FUEL HEATING VALUE; 1.6 TEXT ORGANIZATION; 1.7 GETTING STARTED; 1.8 CLOSING COMMENTS; REFERENCES; PROBLEMS; Chapter 2: Engineering Economics with VBA Procedures; 2.1 INTRODUCTION TO ENGINEERING ECONOMICS 2.2 THE TIME VALUE OF MONEY: PRESENT VALUE (PV) AND FUTURE VALUE (FV)2.3 ANNUITIES; 2.4 COMPARING PROCESS ALTERNATIVES; 2.4.1 Present Value; 2.4.2 Rate of Return (ROR); 2.4.3 Equivalent Annual Cost/Annual Capital Recovery Factor (CRF); 2.5 PLANT DESIGN ECONOMICS; 2.6 FORMULATING ECONOMICSBASED ENERGY

OPTIMIZATION PROBLEMS; 2.7 ECONOMIC ANALYSIS WITH UNCERTAINTY: MONTE CARLO SIMULATION; 2.8 CLOSING COMMENTS; REFERENCES; PROBLEMS; Chapter 3: Computer-Aided Solutions of Process Material Balances: The Sequential Modular Solution Approach; 3.1 ELEMENTARY MATERIAL BALANCE MODULES; 3.1.1 Mixer 3.1.2 Separator 3.1.3 Splitter; 3.1.4 Reactors; 3.2 SEQUENTIAL MODULAR APPROACH: MATERIAL BALANCES WITH RECYCLE; 3.3 UNDERSTANDING TEAR STREAM ITERATION METHODS; 3.3.1 Single-Variable Successive Substitution Method; 3.3.2 Multidimensional Successive Substitution Method; 3.3.3 Single-Variable Wegstein Method; 3.3.4 Multidimensional Wegstein Method; 3.4 MATERIAL BALANCE PROBLEMS WITH ALTERNATIVE SPECIFICATIONS; 3.5 SINGLE-VARIABLE OPTIMIZATION PROBLEMS; 3.5.1 Forming the Objective Function for Single-Variable Constrained Material Balance Problems 3.5.2 Bounding Step or Bounding Phase: Swann's Equation 3.5.3 Interval Refinement Phase: Interval Halving; 3.6 MATERIAL BALANCE PROBLEMS WITH LOCAL NONLINEAR SPECIFICATIONS; 3.7 CLOSING COMMENTS; REFERENCES; PROBLEMS; Chapter 4: Computer-Aided Solutions of Process Material Balances: The Simultaneous Solution Approach; 4.1 SOLUTION OF LINEAR EQUATION SETS: THE SIMULTANEOUS APPROACH; 4.1.1 The Gauss-Jordan Matrix Elimination Method; 4.1.2 Gauss-Jordan Coding Strategy for Linear Equation Sets; 4.1.3 Linear Material Balance Problems: Natural Specifications 4.1.4 Linear Material Balance Problems: Alternative Specifications 4.2 SOLUTION OF NONLINEAR EQUATION SETS: THE NEWTON-RAPHSON METHOD; 4.2.1 Equation Linearization via Taylor's Series Expansion; 4.2.2 Nonlinear Equation Set Solution via the Newton-Raphson Method; 4.2.3 Newton-Raphson Coding Strategy for Nonlinear Equation Sets; 4.2.4 Nonlinear Material Balance Problems: The Simultaneous Approach; REFERENCES; PROBLEMS; Chapter 5: Process Energy Balances; 5.1 INTRODUCTION; 5.2 SEPARATOR: EQUILIBRIUM FLASH; 5.2.1 Equilibrium Flash with Recycle: Sequential Modular Approach 5.3 EQUILIBRIUM FLASH WITH RECYCLE: SIMULTANEOUS APPROACH

Sommario/riassunto

Energy costs impact the profitability of virtually all industrial processes. Stressing how plants use power, and how that power is actually generated, this book provides a clear and simple way to understand the energy usage in various processes, as well as methods for optimizing these processes using practical hands-on simulations and a unique approach that details solved problems utilizing actual plant data. Invaluable information offers a complete energy-saving approach essential for both the chemical and mechanical engineering curricula, as well as for practicing engineers.
