1. Record Nr. UNINA9910823397803321

Autore	Knopf F. Carl <1952->
Titolo	Modeling, analysis, and optimization of process and energy systems / / F. Carl Knopf
Pubbl/distr/stampa	Hoboken, N.J., : Wiley, 2012
ISBN	9786613400796 9781283400794 1283400790 9781118121146 1118121147 9781118121160 1118121163 9781118121139 1118121139
Edizione	[1st ed.]
Descrizione fisica	1 online resource (486 p.)
Classificazione	TEC009010
Disciplina	658.2/6
Soggetti	Factories - Energy conservation Manufacturing industries - Energy conservation Industrial efficiency - Simulation methods Manufacturing processes - Evaluation Electric power-plants - Efficiency
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
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.