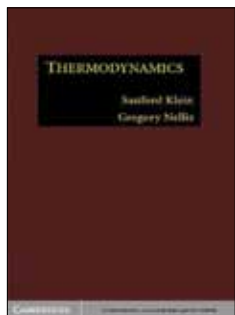


Books

THERMODYNAMICS



Stanford Klein and Gregory Nellis, Cambridge Univ. Press, New York, NY, \$155, 1,104 pages, Oct. 2011, ISBN: 978-0-52-119570-6

Thermodynamics is a mature science, documented in an array of texts. The key difference in this text-book's presentation is its integration of computer tools — specifically the Engineering Equation Solver (EES) program — with thermodynamic

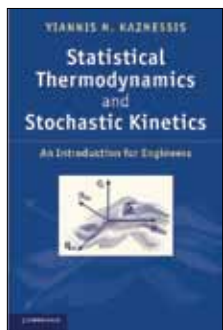
concepts. This combination provides engineering students and practicing engineers with the concepts, tools, and experience needed to solve practical, real-world energy problems they would otherwise not be able to solve.

EES eliminates much of the mathematical complexity involved in solving thermodynamics problems by providing a large bank of high-accuracy property data and the capability to solve large sets of simultaneous algebraic and differential equations. It also provides the capability to check equations for unit consistency, do parametric studies, produce high-quality plots, and apply numerical integration, optimization, and uncertainty analyses. This book teaches readers by example how to use EES most effectively, with more advanced features introduced in a sequential manner throughout the text.

Containing hundreds of illustrations, the book presents a variety of examples of complex and timely real-world problems, with solutions that are complete and do not skip steps. End-of-chapter problems and nearly 300 exercises further illustrate the concepts.

With supplements including software downloads and additional problems and solutions available on an accompanying website, this volume can serve as a lifelong resource for the practicing engineer.

STATISTICAL THERMODYNAMICS AND STOCHASTIC KINETICS: AN INTRODUCTION FOR ENGINEERS



Yiannis N. Kaznessis, Cambridge Univ. Press, New York, NY, \$85, 328 pages, Nov. 2011, ISBN: 978-0-52-176561-9

While macroscopic phenomena and processes remain at the heart of engineering, recent progress in fields like nanotechnology and genetics has shifted engineers' focus to the microcosm. Thermodynamics is applicable at all scales — but absent from the

traditional engineering definitions is a molecular interpretation of thermodynamics' central concepts: energy and entropy. This has made the understanding of thermodynamic behavior at small scales elusive.

This book aims to present thermodynamics from a microscopic perspective, providing engineers with the knowledge needed to apply thermodynamics and solve engineering challenges at the molecular level.

After providing an overarching summary of the main concepts of statistical thermodynamics, the book delves into the topics of entropy and free energy, emphasizing key concepts used in equilibrium applications, while also covering stochastic processes such as stochastic reaction kinetics. The book later explores molecular dynamics and Monte Carlo simulations as natural extensions of the theoretical treatment of statistical thermodynamics, teaching readers how to use computer simulations and thus enabling them to understand and engineer the microcosm.

Rather than focusing on more esoteric concepts of statistical thermodynamics and quantum mechanics, the book provides a classical interpretation of thermodynamic concepts on the microscopic level. Incorporating many worked examples and more than 100 end-of-chapter exercises, the book should be valuable for classroom learning as well as for self-study.

BIOREACTORS: ANALYSIS AND DESIGN



Tapobrata Panda, Tata McGraw Hill Education Private Ltd., New Delhi, India, \$100, 514 pages, Aug. 2011, ISBN: 978-0-07-070424-4

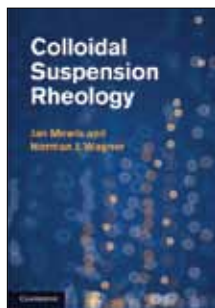
The field of biology has seen many recent advances, requiring practitioners to have a good working knowledge of bioreactors and their operation. Bioreactor operation, analysis, and design are complex phenomena

that apply concepts of mass, momentum, and heat transfer to biological systems. This volume is aimed at addressing the challenges faced by engineering professionals working with such biological processes.

The book begins with overviews of biological reactions, the elements of bioreactor design, and the fundamentals of mass and energy balances in biological reactions. It then discusses key types of bioreactors, such as air-lift reactors, reactors for animal cell processes, and reactors for plant cell processes — detailing their mechanical design configurations, and elaborating on the differing configuration needs of small-scale versus large-scale operations. The application of computational fluid dynamics (CFD) in bioreactors is also

analyzed, as are topics such as nonideal behavior in bioreactors, bioreactor modeling, transport processes, and controls in bioreactors. Case studies and a variety of numerical problems help to better explain the processes.

COLLOIDAL SUSPENSION RHEOLOGY



Jan Mewis and Norman J. Wagner, Cambridge Univ. Press, New York, NY, \$140, 416 pages, Jan. 2012, ISBN: 978-0-52-151599-3

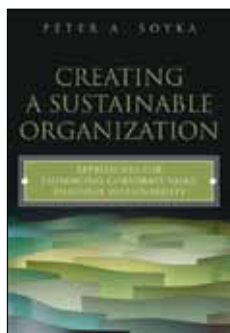
Colloidal suspensions are encountered in a vast array of natural, biological, and industrial products and processes. Understanding the flow behavior of colloid particles, and how colloidal suspensions can be manipulated, is important for successful formulation of products such as paint, polymers, foods, and pharmaceuticals.

While many texts address rheology and colloid science individually, this book is devoted to a systematic, step-by-step study of colloid rheology, presenting its content in a style that will help readers to gain a foothold in the basics of colloid science and rheology.

After setting the stage with an overview of fundamentals, the systematic study of colloid rheology begins with a consideration of hydrodynamic effects and the contributions of Brownian motion and interparticle forces. The reader is then guided through areas of increasing complexity, such as thixotropy and shear thickening, as well as special classes of colloid suspensions. Throughout, the book presents the techniques necessary for measuring colloidal suspension rheology, along with methods to correlate and interpret the results.

The book should be a useful guide for academic and industrial researchers, as well as for graduate-level chemical engineering students.

CREATING A SUSTAINABLE ORGANIZATION: APPROACHES FOR ENHANCING CORPORATE VALUE THROUGH SUSTAINABILITY



Peter A. Soyka, Pearson/FT Press, Upper Saddle River, NJ, \$70, 432 pages, Jan. 2012, ISBN: 978-0-13-287440-3

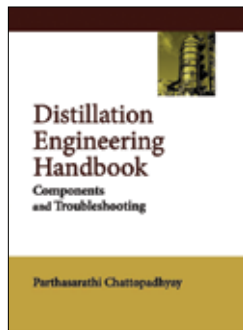
In the introduction to this book, the author notes that “green business” is a bandwagon that many organizations are seeking to drive or at least jump onto. He adds that organizations that prioritize environmental, health, and safety (EHS) issues are

well positioned to attract better customers, better talent, and today’s socially responsible investors. To gain these benefits, however, companies must choose the right sustainability strategies, and then manage and measure them well.

This guide to improving business performance through sustainable practices seeks to link socially responsible investing (SRI) with the increasing interest in corporate sustainability — bridging the realms of the EHS/sustainability professional and the investor/analyst. Real-world examples provide insights into how sustainability impacts today’s enterprises. The book includes best practices for managing sustainability throughout a business. It also examines the links between sustainability and value; how stakeholders influence corporate behavior related to EHS and social equity; and how sustainability can be evaluated by investors, markets, and managers.

This book will be valuable for EHS decision-makers and professionals concerned with improving sustainability and value, for corporate executives and strategists, for investment analysts, and for researchers and MBA candidates studying corporate sustainability.

DISTILLATION ENGINEERING HANDBOOK: COMPONENTS AND TROUBLESHOOTING



Parthasarathi Chattopadhyay, Tata McGraw Hill Education Private Ltd., New Delhi, India, \$290, 1,436 pages, Feb. 2011, ISBN: 978-0-07-070423-7

Since emerging from the alchemist’s lab, distillation has been expanded, modified, upgraded, and integrated with other unit operations to cater to the ever-evolving — and ever more complex — needs of industry.

This book examines all aspects of tray column and packed column design and operation. Beginning with the building blocks of modern distillation engineering — including new developments in distillation and trays and packings — the book explores the equipment and components required for distillation processes — discussing their design, performance, installation, and operation, as well as associated operating problems and troubleshooting. Concepts are reinforced with case studies from major companies involved in fractionation towers and tower internals. The book includes more than 1,000 illustrations, including color photos, line diagrams, tables, and graphs. This resource should be valuable to chemical process engineers and operators, process control engineers, materials science engineers, plant engineers, and mechanical equipment designers, as well as chemical engineering students.

CEP