Thermodynamic Optimization of Finite-Time Processes

R. S. Berry, V. A. Kazakov, S. Sieniutycz,
Z. Szwast and A. M. Tsirlin

Thermodynamic Optimization Of Finite Time Processes

Stanislaw Sieniutycz,Alexis De Vos

Thermodynamic Optimization Of Finite Time Processes:

Entropy Generation Minimization Adrian Bejan,1995-10-20 This book presents the diverse and rapidly expanding field of Entropy Generation Minimization EGM the method of thermodynamic optimization of real devices The underlying principles of the EGM method also referred to as thermodynamic optimization thermodynamic design and finite time thermodynamics are thoroughly discussed and the method s applications to real devices are clearly illustrated The EGM field has experienced tremendous growth during the 1980s and 1990s This book places EGM s growth in perspective by reviewing both sides of the field engineering and physics Special emphasis is given to chronology and to the relationship between the more recent work and the pioneering work that outlined the method and the field Entropy Generation Minimization combines the fundamental principles of thermodynamics heat transfer and fluid mechanics EGM applies these principles to the modeling and optimization of real systems and processes that are characterized by finite size and finite time constraints and are limited by heat and mass transfer and fluid flow irreversibilities Entropy Generation Minimization provides a straightforward presentation of the principles of the EGM method and features examples that elucidate concepts and identify recent EGM advances in engineering and physics Modern advances include the optimization of storage by melting and solidification heat exchanger design power from hot dry rock deposits the on the production of ice and other solids the maximization of power output in simple power plant models with heat transfer irreversibilities the minimization of refrigerator power input in simple models and the optimal collection and use of solar energy   **Thermodynamic Optimization of Finite-Time Processes** R. S. Berry,V. Kazakov,S. Sieniutycz,Z. Szwast,A. M. Tsirlin,2000-02-03 The first book to provide a comprehensive treatment integrating finite time thermodynamics and optimal control giving an overview of important breakthroughs in the last 20 years It presents a survey of the optimization technique including the basics of optimal control theory and the principal thermodynamic concepts and equations In addition it covers the solutions of a variety of finite time thermodynamic problems including coverage of their potential applications for the design of real technological processes such as heat exchange systems mass transfer and separation processes commodity exchange as a finite time thermodynamic process heat driven mechanical processes with one or several reservoirs This is a key resource for chemical and mechanical engineers involved in power systems and process engineering Researchers in theoretical physical and industrial chemistry in academia and in industry will also welcome this book for the fresh perspectives that offer new ways to design and analyze a wide variety of processes   *Recent Advances in Finite-time Thermodynamics* Chih Wu,1999 Finite time thermodynamics FTT is one of the newest and most challenging areas in thermodynamics The objective of this book is to provide results from research which continues at an impressive rate The authors make a concentrated effort to reach out and encourage academic and industrial participation in this book and to select papers that are relevant to current problems and practice The numerous contributions from the international community are indicative of the continuing global interest in finite time thermodynamics All represent

the newest developments in their respective areas **Thermodynamics of Energy Conversion and Transport** Stanislaw Sieniutycz,Alexis De Vos,2012-12-06 It is becoming more and more important to manage energy resources effectively to maximize their benefits while minimizing the negative environmental impacts Scientist and engineers are thus faced with the problem of optimizing complex systems subject to constraints from ecology economics and thermodynamics It is chiefly to the last that the present volume is addressed Nonequilibrium thermodynamic approaches such as finite time thermodynamics and Second Law analyses can provide realistic models and analyses that can be used to search for optimum ways to operate machines and processes Intended for physicists chemists and engineers this volume reviews the state of the art in the thermodynamics of energy conversion and transmission Using examples from solar thermal mechanical chemical and environmental engineering the book focuses on the use of thermodynamic criteria for optimizing energy conversion and transmission The first set of chapters focuses on solar energy conversion the second set discusses the transfer and conversion of chemical energy as in internal combustion engines or distillation columns a concluding set of chapters deals with geometric methods in thermodynamics Thermodynamic Approaches in Engineering Systems Stanislaw Sieniutycz,2016-05-20 Thermodynamic Approaches in Engineering Systems responds to the need for a synthesizing volume that throws light upon the extensive field of thermodynamics from a chemical engineering perspective that applies basic ideas and key results from the field to chemical engineering problems This book outlines and interprets the most valuable achievements in applied non equilibrium thermodynamics obtained within the recent fifty years It synthesizes nontrivial achievements of thermodynamics in important branches of chemical and biochemical engineering Readers will gain an update on what has been achieved what new research problems could be stated and what kind of further studies should be developed within specialized research Presents clearly structured chapters beginning with an introduction elaboration of the process and results summarized in a conclusion Written by a first class expert in the field of advanced methods in thermodynamics Provides a synthesis of recent thermodynamic developments in practical systems Presents very elaborate literature discussions from the past fifty years **Non-equilibrium Thermodynamics For Engineers (Second Edition)** Signe Kjelstrup,Dick Bedeaux,Eivind Johannessen,Joachim Gross,2017-02-15 Kjelstrup Bedeaux Johannessen and Gross describe what non equilibrium thermodynamics is in a simple and practical way and how it can add to engineering design They explain how to describe proper equations of transport that are more precise than those used so far and how to use them to understand the waste of energy resources in central process units in the industry The authors introduce the entropy balance as an additional equation to use in engineering to create consistent thermodynamic models and to systematically minimize energy losses that are connected with the transport of heat mass charge and momentum Non equilibrium Thermodynamics for Engineers teaches the essence of non equilibrium thermodynamics and its applications at a level comprehensible to engineering students practitioner engineers and scientists working on industrial problems The book may

be used as a textbook in basic engineering curricula or graduate courses *The Nature of Motive Force* Achintya Kumar Pramanick,2014-08-23 In this monograph Prof Pramanick explicates the law of motive force a fundamental law of nature that can be observed and appreciated as an addition to the existing laws of thermodynamics This unmistakable and remarkable tendency of nature is equally applicable to all other branches of studies He first conceptualized the law of motive force in 1989 when he was an undergraduate student Here he reports various applications of the law in the area of thermodynamics heat transfer fluid mechanics and solid mechanics and shows how it is possible to solve analytically century old unsolved problems through its application This book offers a comprehensive account of the law and its relation to other laws and principles such as the generalized conservation principle variational formulation Fermat s principle Bejan s constructal law entropy generation minimization Bejan s method of intersecting asymptotes and equipartition principle Furthermore the author addresses some interrelated fundamental problems of contemporary interest especially to thermodynamicists by combining analytical methods physical reasoning and the proposed law of motive force This foundational work is a valuable reading for both students and researchers in exact as well as non exact sciences and at the same time a pleasant learning experience for the novice **Thermodynamics** Juan Carlos Moreno Piraján,2011-09-15 Thermodynamics is one of the most exciting branches of physical chemistry which has greatly contributed to the modern science Being concentrated on a wide range of applications of thermodynamics this book gathers a series of contributions by the finest scientists in the world gathered in an orderly manner It can be used in post graduate courses for students and as a reference book as it is written in a language pleasing to the reader It can also serve as a reference material for researchers to whom the thermodynamics is one of the area of interest *Heat and Mass Transfer* ,2019-09-11 Heat and mass transfer is the core science for many industrial processes as well as technical and scientific devices Automotive aerospace power generation both by conventional and renewable energies industrial equipment and rotating machinery materials and chemical processing and many other industries are requiring heat and mass transfer processes Since the early studies in the seventeenth and eighteenth centuries there has been tremendous technical progress and scientific advances in the knowledge of heat and mass transfer where modeling and simulation developments are increasingly contributing to the current state of the art Heat and Mass Transfer Advances in Science and Technology Applications aims at providing researchers and practitioners with a valuable compendium of significant advances in the field **Marks' Standard Handbook for Mechanical Engineers, 12th Edition** Ali M. Sadegh,William M. Worek,2017-11-10 The 100th Anniversary Edition of the Bible for Mechanical Engineers Fully Revised to Focus on the Core Subjects Critical to the Discipline This 100th Anniversary Edition has been extensively updated to deliver current authoritative coverage of the topics most critical to today s Mechanical Engineer Featuring contributions from more than 160 global experts Marks Standard Handbook for Mechanical Engineers Twelfth Edition offers instant access to a wealth of practical information on every essential aspect of mechanical engineering It provides clear

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