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Book review

FUNDAMENTALS OF ENGINEERING THERMODYNAMICS
Michael J. Moran and Howard N. Shapiro
John Wiley & Sons, New York, Fourth Edition, 2000, 918 pp, indexed

The word thermodynamics stems from the Greek words 'therme' (heat) and 'dynamis' (force). The formal study of thermodynamics began with considerations of the motive power of heat: the capacity of hot bodies to produce work. Today the scope is broader, extending generally to energy and to relationships between the properties of matter.
Thermodynamics is both a branch of physics and an engineering science. The scientist is normally interested in gaining a fundamental understanding of the physical and chemical behavior of fixed quantities of matter at rest. Engineers are rather interested in the study of systems and how they interact with their surroundings. To facilitate this, engineers widen the subject of thermodynamics to include the study of systems through which matter flows. Engineers also make use of principles drawn from thermodynamics and other engineering sciences, such as fluid mechanics, heat and mass transfer, to analyze and design objects intended to meet human needs.
The basic objectives in the fourth edition of this book are 1. to present a thorough treatment of engineering thermodynamics from a classical viewpoint, 2. to provide a sound basis for subsequent courses in fluid mechanics and heat transfer, and 3. to prepare students to apply thermodynamics in engineering practice. A background in elementary physics and calculus is presumed.
The main chapters and topics of the book are as follows: introduction, first law, evaluating properties, control volume energy analysis, second law, entropy, exergy, vapor power systems, gas power systems, refrigeration and heat pump systems, thermodynamic relations, ideal gas mixtures and psychometrics, reacting mixtures and combustion, chemical phase equilibrium, appendix.
Included are new text elements and interior design features that help students read and study the subject matter. Further, the authors have incorporated the optional use of the software 'Interactive Thermodynamics' into the text in a manner that allows instructors to use software in their courses.
New features of the fourth edition are 1. new formal examples to address common points of difficulty for students, 2. solved examples, 3. revised end-of-chapter and open-ended problems, 4. inclusion of the property tables for new natural refrigerants, e.g. propane, and 5. presentation of updated material on engineering design and thermoeconomics.

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An up-to-date presentation of exergy analysis, including an introduction to chemical exergy, is also provided. Exergy concerns the extractable energy of a system in particular surroundings. We must know both of the system and the surroundings to be able to tell what fraction of the total energy of the system can be extracted to perform useful work.
This book provides a comprehensive introduction to thermodynamics for engineering students and for practising engineers working in the energy field. The text has evolved over many years of teaching the subject matter at both undergraduate and graduate levels. Clear and complete explanations, together with numerous well-explained examples, make the text user-friendly and nearly self-instructive. Favorable evaluations from the instructors and students who have used the previous editions in a wide range of engineering programs indicate that the main objectives of the authors have been met.
The book can be suggested as a textbook for students of mechanical, chemical, biochemical, environmental and energy systems engineering, and also for self-study. Sufficient end-of-chapter problems are provided for these uses.

Prof. Zsolt Fonyó