of convection induced by fires, both open and enclosed. For the most part, the subject does not admit rigorous and detailed analysis. Such quantitative understanding as exists is vitally dependent on physical modeling concepts, typically retaining only the coarsest flow features, as refined in the light of experimental information from diverse sources. Application of similarity concepts to develop correlations and for interpretation of data to elucidate physical concepts is a prominent feature of fire research, and is deservedly emphasized in the present work.

Unquestionably, there is a need for information respecting fire-induced convection to be pulled together in the literature. As the sole attempt to do so, Murgai's effort to do so constitutes a valuable resource for the aspiring or practicing fire scientist. But it falls seriously short of this need in some important respects.

Literature coverage effectively terminates at 1970. By then, understanding of convection induced by open fires fairly approximated its present state. But, since 1970, so much has been done on enclosure fires that these volumes are useful only as an introduction.

The writing is at the level of a specialist in applied mechanics and this reviewer judges the material, as presented, inaccessible to most engineers. Even for the specialist, the organization causes considerable frustration. There is considerable cross-referencing, and extensive and sometimes redundant development of methods of approach. Little space is devoted to comparative evaluation of alternate approaches or to critical discussion of the diverse modeling concepts covered.

R. C. Corlett

Department of Mechanical Engineering
University of Washington
Seattle
Washington 98195
U.S.A.

V. Radcenco, **Optimization Criteria for Irreversible Thermal Processes (Criterii de Optimizare a Proceselor Termice Ireversibile)**, Editura Tehnica, Bucharest (1977) 468p.

This book treats the subject of thermal process design, relying heavily on the concept of irreversibility production and its engineering implications. As such, it is a courageous attempt to summarize for the reader a new and important trend in thermal engineering, namely, the infusion of second law concepts into a field traditionally dominated by first law considerations. For this reason, Dr. Radcenco's book deserves serious attention.

The book is addressed to engineers with an undergraduate knowledge of classical thermodynamics, heat transfer, and fluid mechanics. Its main objective is to convey a design optimization philosophy which takes into account the fact that the irreversibility associated with any thermal process results in lost useful work. The material is grouped into eleven chapters which discuss, in order, the engineering consequences of the second law of thermodynamics, the optimization of processes in piston expanders, one- and two-stage compressors, internal combustion engines, gas turbine engines, turbojet engines and vapor-compression refrigeration plants.

The most useful and instructive part of the book is the first chapter, in which the author develops the known second law result whereby the useful mechanical power lost in a steady-state, steady-flow process is equal to the total rate of entropy generation (internal and external to the process) times the absolute temperature of the surroundings [see, for example, G. J. Van Wylen and R. E. Sonntag, *Fundamentals of Classical Thermodynamics*, 2nd Edition, Wiley, New York (1973), pp. 271–277]. Dr. Radcenco calls this result the "Gouy-Stodola Theorem". Next, the associated concepts of exergy, exergy accounting and exergy efficiency are presented. The author makes a special and very appropriate effort to expose the parallel existing between the new name "exergy" and older terms such as "availability" and "useful energy".

The remainder of the first chapter is devoted to analyzing a number of elementary processes which are responsible for the production of irreversibility in practical thermal processes. This list includes filling and discharging, mixing, throttling, heat transfer processes and combustion. However, the subject of irreversibility production through heat transfer is considered much too briefly; as an example, the author analyzes the irreversibility of a two-fluid parallel flow heat exchanger with zero pressure drop.

The rest of the book contains the case-by-case design optimization of work transfer devices, such as reciprocating and rotating expanders and compressors. The relative imbalance in the treatment of heat transfer versus work transfer components may be explained in terms of the author's own research interest. From the reader's point of view, however, this imbalance weakens the book considerably. As a treatment of all irreversible thermal processes, the book is incomplete. For the study of irreversibility production and minimization in heat exchangers, the reader should consult other sources, such as the article, A. Bejan, The concept of irreversibility in heat exchanger design: counterflow heat exchangers for gas-to-gas applications, *J. Heat Transfer* **99**, 374–380.

Despite its limitations, the book is an excellent reference text, particularly with regard to second law analysis and the optimization of work transfer components. It contains a total of 103 references, most of which are drawn from local sources, some published in Russian and Romanian. The book is written in Romanian, which makes its table of contents and structure, at least, accessible to readers acquainted with any other Romance language.

For its uniqueness, Dr. Radcenco's book is recommended highly to researchers active in the area of irreversibility analysis and minimization in thermal engineering. The first chapter is a very good exposition of the position occupied by the second law of thermodynamics in thermal design.

Adrian Bejan

Assistant Professor,
Department of Mechanical Engineering,
University of Colorado,
Boulder, Colorado 80309,
U.S.A.