medium. This extends work which previously had been confined to premixed gases. The second paper presents calculations of combustion within porous material such as occur in coal gasification, coal bed burning, etc. The major novelty of this work is the use of a two-stage chemical reaction model which takes account of the diffusion of oxygen from the gas stream into the solid at the first stage before the chemical combination occurs at the second stage.

The remaining chapter using FD methods looks at the problem of transient conjugate forced convection from circular tubes in cross flow during start-up or shut-down in, for example, heat exchangers and power plants.

The remaining chapter of the book applies the 'gridless' random-walk technique of Chorin, for simulating diffusion effects, to calculate the transient heat transfer from a flat plate in steady motion. A method of repeated application is developed which allows ensemble averaging, thereby yielding smooth instantaneous temperature profiles and hence reliable heat transfer values.

Overall I judge this to be a very useful book which, whatever your interest in numerical heat transfer research, is likely to yield nuggets of valuable information.

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The Exergy Method of Thermal Plant Analysis

T. J. Kotas

The publication of Professor Kotas' book is an important event that will be noted by the engineers and educators who are active on the frontier of engineering thermodynamics today. The title of the book is very descriptive: it draws attention to the main mission of this treatise, which is to present the method of exergy analysis (or second-law analysis) and its main applications in energy and chemical engineering. Professor Kotas' treatment extends well beyond the simple 'presentation' of the method. This book is also an effort to make the engineer comfortable with the terminology and methodology of second-law analysis. The book is rich in worked-out examples and graphical construction of high quality.

I see two additional reasons why this book will be received with interest. My own view of the exergy field is that over the past 20–30 years, the growing popularity of the exergy method has led to a distinct body of literature, for example, journal articles and, especially, research monographs. Professor Kotas' book is one of the very few that bridge the gap between this new methodology and the traditional coverage of engineering thermodynamics. If used as a textbook, this book will be very effective in blending exergy analysis with engineering thermodynamics in the classroom.

The second reason has to do with the historical development of the exergy based methodology. Although the search for the true measure of 'useful energy is as old as the subject of classical thermodynamics', the exergy method took shape as a distinct chapter in engineering thermodynamics in the 1950s. A significant portion of the early growth of this new field was documented in German, Polish, Russian and a few other languages of Central Europe, in the works of Bosnjakovic, Rant, Brodyanskii, Szargut and Petela, among others. Professor Kotas' contribution is that it presents a balanced coverage of the English-language literature, which is relatively newer, next to the literature of the other Europe.

The book is organized into six large chapters:

1. Review of the fundamentals
2. Basic exergy concepts
3. Elements of plant analysis
4. Exergy analysis of simple processes
5. Examples of thermal and chemical plant analysis
6. Thermoeconomic applications of exergy

The six appendices (51 pages) that complete the book contain a large amount of thermodynamic data, especially on chemical exergy. The total number of references quoted is 90.

I recommend this book without any reservation. It presents a bird's-eye-view of the newest sector of engineering thermodynamics, and teaches the exergy method attractively and effectively. Mechanical and chemical engineering departments should consider adopting Professor Kotas' book as text for the second-level, applications-orientated, courses on engineering thermodynamics.

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