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BOOK REVIEWS

O. E. ROSNER, **Transport Processes in Chemically Reacting Flow Systems.** Butterworths, 1986, xxvii + 540 pp.

THIS BOOK presents a wide-ranging treatise of the concepts and techniques used in chemically reacting flow systems, of engineering interest.

The text was based on the author's teaching of Yale University undergraduate and graduate courses, and was put into its present form with the partial support of EXXON Research and Engineering Co. and Olin Corporation.

The author places the emphasis clearly on generality of principles and on developing the information and skills to formulate and solve engineering problems involving rates of energy, mass and momentum transport in fluids that may be reacting chemically.

The layout in the text is discussed by the author in the Preface of the book, where he provides a particularly useful indication of the topics covered in the various chapters.

The contents are arranged in eight chapters with the following headings:

1. Introduction to Transport Processes in Chemically Reactive Systems.
2. Governing Conservation Principles.
3. Constitutive Laws: The Diffusion Flux Laws and Their Coefficients.
4. Momentum Transport Mechanisms, Rates and Coefficients.
5. Energy Transport Mechanisms, Rates, and Coefficients.
6. Mass Transport Mechanisms, Rates, and Coefficients.
7. Similitude Analysis with Application to Chemically Reactive Systems—Overview of the Role of Experiment and Theory.
8. Problem-solving Techniques, Aids, Philosophy: Forced Convective Heat and Mass Transfer to a Tube in Cross-flow.

Solutions to Selected Exercises and Index.

Each chapter is followed by a Summary, True/False Questions, Exercises, References and Bibliography. The book is well organized for educating students and for reference purposes, and includes excellent exercises, at the end of each chapter, which both illustrate and extend the text. Solutions to some of these exercises are included at the end of the book. Furthermore, Chapter 8 is devoted to a numerical example that is used as a prototype for problem solving. The exercises together with the contents of Chapter 8 constitute, to the present reviewer's opinion, the strong point of this book.

The style of presentation is simple and the text design quality is good, making this book easy to read. It is well printed and illustrated, free of errors, apart from the common nowadays split infinitives, and with no serious misprints. The text layout is of a good standard with clear diagrams and neatly laid out mathematical expressions.

The references include several good texts which provide more details on the relevant topics. A few sections appear to the present reviewer superfluous and should either be extended or omitted in a future edition. For example, appendix 5.1 on Fourier Method of separation of variables and Eigenfunction Expansion is of no use to the reader who is not already familiar with this method, except as a reminder of its existence. The same is more or less true for turbulence modelling, finite-difference, finite-element and method of weighted residuals, topics with ever increasing interest. They should be dealt with in more detail, in a future edition, without unduly expanding the volume of the book. The reviewer appreciated particularly the author's effort to emphasize the use of fundamental laws in the intelligent exploitation of a judicious blend of experiment, analysis, and numerical methods, first to develop the required understanding and then to develop mathematical models for the essential engineering problems involving energy, mass and momentum exchange.

The material is very suitable for teaching courses at various levels, and will appeal to lecturers, students and researchers in science and engineering, who will find a generous stock of material to select to suit their needs. The book should also appeal to any practitioner who wishes to gain further experience of the topic, and develop various levels of problem-solving skills.

In short, I recommend the book to anyone interested in an intelligent technical text on Chemically Reacting Flow Systems. It is a very useful book, providing solid methodology and applications with direct physical background.

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JAMES SUCEC, **Heat Transfer.** Wm. C. Brown, 1985, xvii + 837 pp.

THIS BOOK grew out of the author's experience in teaching a one-semester course in heat transfer to students in an engineering curriculum. It is intended to serve as a thorough text for an engineering course in heat transfer, at the junior or senior level, and to be used as a reference book for practising engineers. According to this reviewer's opinion this purpose has been adequately accomplished in this book.

The well-presented text is divided into nine chapters, as follows:

1. Introduction to Heat Transfer.
2. Steady-state Conduction.
3. Unsteady-state Conduction.
4. Radiation Heat Transfer.
5. Forced-convection Heat Transfer.
6. Free Convection.
7. Heat Transfer in Condensation and Boiling.
8. Heat Exchangers.
9. Additional Topics in Heat Transfer.

Appendices and Index.

Homework problems (both in English Engineering System and SI units) and references follow each chapter.

Chapter 1 discusses the three fundamental modes of heat transfer and the laws governing the energy transfer rates, emphasizing conservation and its importance in solving problems.

Chapter 2 deals with quasi-one-dimensional conduction and develops criteria of acceptance of this approximation. Furthermore, it exposes the boundary conditions, in a very useful way from the teaching point of view. Finally, it discusses two- and three-dimensional conduction, including analytical and numerical solutions.