

Book Review

D. Drysdale, *An Introduction to Fire Dynamics*, John Wiley and Sons, New York, 1985, xvi + 424 pp., \$44.95

Our understanding of unwanted fires has been developing rapidly; however, this information is widely scattered in the literature because of the interdisciplinary nature of fire. *An Introduction to Fire Dynamics* does an admirable job of bringing this material together to provide a comprehensive and readable introduction to fire phenomena. The book is designed as a text for an introductory course in fire processes, for first-year graduate students in fire-engineering programs. It is well-suited for this purpose. The book also should be a valuable reference for scientists and engineers interested in aspects of fires.

A background typical of an undergraduate engineering and science degree is assumed. However, fundamentals needed to study fires are reviewed in the first two chapters, e.g., fuel properties, thermodynamics, thermochemistry, heat transfer, and fluid dynamics. Specific fire phenomena are discussed in the next several chapters, including: premixed flames and flammability limits; diffusion flames and fire plumes; burning of liquids and solids; ignition of gases, liquids, and solids; flame spread; spontaneous ignition of solids; and smoldering combustion. The last three chapters integrate this material to consider fires as a system, e.g., preflashover compartment fires, postflashover compartment fires and the spread of fire from a compartment, and the production and movement of smoke.

The discussion of each aspect of fire generally includes simplified phenomenological analysis,

e.g., the Frank-Kamenetskii derivation for the fundamental burning velocity of premixed flames. Analysis, however, is liberally supplemented by discussion of experimental results. In keeping with the objectives of an introductory textbook, the author provides problems to be worked by students, as well as a list of answers, for all chapters except the last three dealing with fire systems.

In general, the book is successful as a readily understandable introduction to fire phenomena for both students and specialists. One criticism is that methods seem dated at times. For example, the Schmidt graphical method is discussed as a way to solve transient conduction heat-transfer problems, which seems inappropriate because of the wide availability of computers today. Another omission involves the lack of consideration of computer computations of equilibrium flame properties, which is also familiar to most individuals in the fire field. Furthermore, because of their greater scope and more-advanced approach, several other available texts would be more appropriate for a typical first course in combustion. However, even when another text is used, the clarity of Drysdale's discussions of fundamentals provides ample reason to recommend his book as a course reference.

In summary, *An Introduction to Fire Dynamics* provides a timely and accessible summary of current understanding of fires. It is a valuable addition to the combustion literature and is recommended as a text for graduate-level fire-engineering programs and as a reference work for specialists in the field.

G. M. Faeth
The University of Michigan
Ann Arbor, Michigan