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Book Reviews

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Combustion, 4th Edition

Warnatz, J., Maas, U., and Dibble, R. W., Springer, Berlin, 2006, 378 pp., $69.95

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DESPITE being considered an "old technology" by some, combustion remains one of the most fascinating and important subjects and one that cuts across many disciplines. This is witnessed by publications and revisions of several combustion texts within the past few years. This book, now in its fourth edition, is intended as a text for beginning graduate students who are interested in some of the basic elements of combustion processes. The first edition was based on the lecture notes of the lead author. Since then, the book has undergone several revisions and the present edition is a valuable source for learning combustion and some of its applications.

I agree with the authors' statement in the Preface: "...the book provides a common basis from which research begins..." Throughout the book, the level of mathematics is fairly elementary. Thus, the subject can be followed by the targeted audience. In this regard, this book is somewhat similar to several other combustion texts, both modern [1] and old [2]. However, I am not sure if I fully agree with the claim on the back cover that "This book provides a detailed and rigorous treatment of the coupling of chemical reactions and fluid flow..." In this regard, the book does not have the same level of rigor, mathematical elegance, and completeness as covered in some of the classics such as *Combustion Theory* [3].

The authors have done an excellent job of organization. In 21 chapters, they cover most of the materials pertaining to combustion. This includes all of the fundamental disciplines (thermodynamics, fluid dynamics, transport phenomena, and chemical kinetics), basic elements of combustion (reaction mechanisms, ignition, liquid and solid fuels, soot and NOx formation, laminar and turbulent premixed and nonpremixed flames, etc.), applications (engine knock, composition of atmosphere, etc.), and supporting materials (such as measurement techniques and simulation algorithms). The presentation of each of the topics is necessarily (and at times *painfully*) brief. This is appropriate for a novice, but it will surely tease an experienced reader. The extent and scope of coverage on advanced topics is not uniform. This is understandable considering the broadness of the field of combustion. However, even in the content and context considered, some of the modern methodologies are ignored! This could make it difficult to use the book for more than one semester. Each chapter is accompanied by a set of useful and well-thought exercises, some of which appear extensive and very time-consuming. The bibliography is not exhaustive, but the 400 or so literature citations provide a valuable source for further information.

In summary, I enjoyed reading this book and I recommend it. I may consider adopting it as a required text when I teach combustion again.

References

[1] Turns, S. R., *An Introduction to Combustion*, 2nd ed., McGraw–Hill, New York, 2000.
[2] Spalding, D. B., *Some Fundamentals of Combustion*, Butterworths, London, 1955.
[3] Williams, F. A., *Combustion Theory*, 2nd ed., Benjamin Cummings, Menlo Park, CA, 1985.

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