

with Britton Chance some of the pioneering experiments that demonstrated electron tunneling, so he is well qualified to write on this fascinating subject.

Proteins are basically insulating materials with deeply buried redox sites (localized electron carriers), hence there has always been a strong interest in tunneling mechanisms of charge transfer in the metabolic pathway and in the photosynthetic system. Molecular tunneling may also play an impor-

tant role in enzyme catalysis because of the highly forbidden nature of some biological reactions. It is thus important that physicists acquaint themselves both with the mass of experimental data and the theories that claim to explain the processes.

DeVault succeeds very well in an exhaustive documentation of probable tunneling processes, and in a detailed description of the nonadiabatic theory that lies behind attempts to include the

protein structure in the tunneling calculations. DeVault speaks clearly, but too passively. He does not, in my opinion, provide enough of a critical view to guide the reader towards the good theories and away from the bad, hence one can easily fail to get a firm view of what is the basic physics that any theory must have. As we begin to confront the hard reality of detailed x-ray structures and accurate kinetics with the rather vague theories that exist, it will be important that we develop a unified view of the essential physics of the process. This book is a workman-like start, but does not really condense the swarm of data and theory into a comprehensive whole. I recommend the book as a good point from which to begin the search.

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Fusion: An Introduction to the Physics and Technology of Magnetic Confinement Fusion

W. M. Stacey Jr
260 pp. Wiley, New York, 1984. \$39.95

During the past decade, the engineering requirements of magnetic-confinement fusion-power development have been given increased emphasis within the international fusion community. One example of this emphasis is the ongoing design activity for the International Tokamak Reactor, initiated in 1979 under the auspices of the IAEA and involving design teams from the European community, Japan, the Soviet Union and the United States. Although commercial fusion power is not expected to be realized until the next century, thousands of scientists and engineers are pursuing this goal. In response to this situation, several universities have added fusion engineering courses to their curricula. The purpose of these courses is to integrate plasma physics and engineering disciplines in the context of fusion power development. Weston M. Stacey Jr offers *Fusion* as a broad introduction to the subject of fusion engineering. In general the book succeeds in its purpose and should prove to be a useful text in fusion engineering courses.

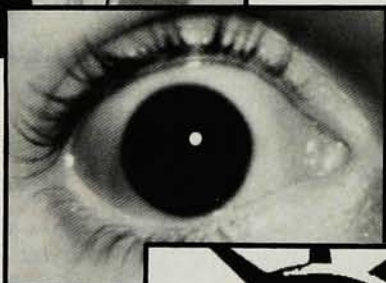
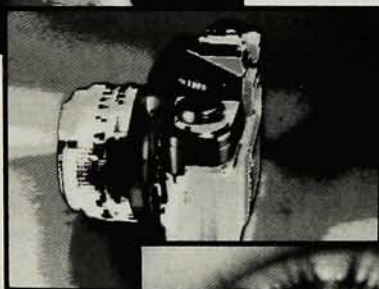
The book is intended for a two-course sequence offered to advanced undergraduates and first-year graduate students with a physics or engineering major. Following a brief introduction dealing with the potential and status of magnetic fusion power, the flow of the book is systematic, beginning with the plasma and concluding with reactor design. Stacey starts with a helpful discussion of fundamental plasma characteristics, such as frequency, scattering times and drifts, and then pro-

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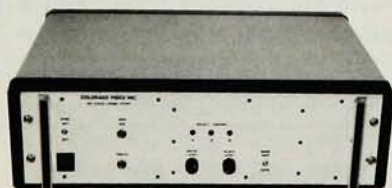


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ceeds to general considerations of plasma equilibrium and classical transport. The basics presented in the early chapters provide the foundation for examining specific magnetic-confinement concepts in subsequent chapters. Stacey covers well the physics and technology of the principal plasma heating techniques and also deals effectively with the challenging area of plasma wall interactions. He considers in some detail the electrical engineering aspects of fusion reactor design, such as magnet design and energy storage systems. He also seriously examines nuclear engineering issues, such as radiation damage, tritium breeding and tritium control.

Stacey's book is very clearly written and makes good use of figures and tables. The physics discussions, in particular, offer a well-balanced blend of mathematics and insights. The material included is relevant and timely, useful problems for homework are provided, and the scope of the coverage is comprehensive. Currently there are three texts which could be employed for an introductory fusion engineering course: *Fusion Research* (3 vols., Pergamon, New York, 1982) by Thomas J. Dolan; *Fusion Energy* (Wiley, New York, 1984) by Robert A. Gross; and the book by Stacey. Of the three, Stacey's book offers the best mixture of scope and clarity, and is the text I would recommend.

Although this book has many positive attributes, it also exhibits several weaknesses that could be remedied in a future edition. The individual chapters contain no references. This shortcoming is only partially compensated for by a suggested reading list at the end of the book. There is an unevenness in the writing style. Many sections exhibit the tutorial and instructional style of a text, but other sections have the summary style of a technical report. The author, in fact, notes that he took a few sections from reports. Some of the subsections are far too brief and need to be expanded if they are to be designated as subsections: for example, those on economic feasibility, fusion alpha heating, and comparison of reactor concepts. Another flaw is the absence of a consideration of the environmental and safety implications of fusion power. In my opinion, the major shortcoming of the book is that it tends to be overly terse and abbreviated. While the text serves as an excellent teaching guide, I believe that the instructor would have to provide substantial supplementary material to fill in the missing steps.

Weston Stacey is an active contributor to the fusion program and is highly regarded within the fusion community. In this book he provides a useful and welcome text for an introductory course in fusion engineering. The

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