# Book Review

**Fusion Plasma Analysis.** By Weston M. Stacey, Jr. Wiley-Interscience, New York (1981). 376 pp. $32.95.

Magnetic fusion is maturing as a discipline to the point that large-scale engineering is beginning to dominate the program. As a consequence, there is an increasing need for training in the field known as plasma engineering, an area that encompasses the conceptual and practical elements of producing and controlling plasma discharges, particularly those of high-power density. Coverage of this field requires a heavy dose of plasma physics and lesser, but still significant, doses of electrical engineering, atomic physics, surface physics, and materials science.

With the publication of *Fusion Plasma Analysis,* Bill Stacey has performed a valuable service for the fusion community. He has pulled together into a coherent treatise the essential relevant material from these diverse disciplines, heretofore available only in widely scattered form. In so doing, he has made it much easier to educate the legion of engineers and scientists that will help to design, build, and operate the first fusion reactors.

The text systematically develops the tools needed in the design of magnetic fusion reactors. Stacey's credentials in this area are impeccable, as evidenced by his role in recent years as the coordinator of the U.S. contribution to the design of an international tokamak reactor. Particularly definitive is Stacey's treatment of tokamaks. While there is material on the other leading magnetic fusion concepts, i.e., mirror, Elmo Bumpy Torus, and reversed field pinch, little attempt has been made to integrate this material into the main body of the text. As a result, while *Fusion Plasma Analysis* is highly recommended as a textbook in magnetic fusion, as a reference document its audience will probably be limited to tokamak researchers.

The greatest strength of the book resides in its sharp focus on the key physical concerns. Thus, even though extensive formalisms are developed, one rarely loses sight of the crux of the arguments. This is especially useful in enabling the impatient reader to skip the details of the derivations while retaining, intact, the logical flow. It is no mean feat to maintain a cohesive, logical flow in a field that relies so heavily upon empiricism.

The depth of the presentation is, with only a few exceptions, appropriate for an entry-level graduate course. However, in a number of areas, mastery of the material presented is adequate for research purposes, incorporating as it does the key results from the relevant archival literature. Students should find this self-contained bridge between introductory and state-of-the-art material particularly helpful. Inclusion of the extensive set of problems and a supplementary reading list will enhance its use as a primary source book in classroom applications.

The primary drawback of the book is the plethora of typographical errors, particularly in the equations. In a number of instances, this renders derivations very difficult to follow. It is hoped that this defect will be rectified in a future edition. The usefulness of the book to physics, applied physics, nuclear engineering, and electrical engineering departments and the rapid pace of advancement in the field all serve to encourage the appearance of such a future edition.

To summarize, *Fusion Plasma Analysis* is a welcome contribution to the literature on magnetic fusion. It exposes the student both to the basic tenets of plasma engineering and to the horizons of current research. Furthermore, it will prove to be a valuable addition to the libraries of the workers presently involved in the design of first-generation fusion reactors.

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*About the Reviewer: John Rawls, a member of the fusion organization of General Atomic Company, has specialized in recent years in the design of advanced magnetic confinement devices. Following Dr. Rawls' graduate studies at Brandeis University, he was a member of the faculty of the physics departments at Yale University and the University of California, San Diego.*