Book Reviews

Plasma Physics. By E. W. Laing. Crane, Russak and Company, Inc. (1977). 224 pp. $18.50.

This monograph is the fourth in a series entitled "Graduate Student Series in Physics." There is no preface by the General Editor (Douglas F. Brewer of the University of Sussex) and no explanation of what a "graduate student series" is intended to be. If the intention was to provide a brief and readable survey that would whet the appetite of graduate students and induce them to explore further, then Dr. Laing's little book succeeds very well.

The writing is in a breezy, pleasant, informal style. The printing is excellent and misprints are few and far between. It is in no sense a textbook, the coverage of topics being very limited and brief, but the author's own preface makes it clear that there were no intentions along these lines at all.

The eight chapters are divided into two distinct parts. The first four chapters are entitled "An Introduction to Plasma Physics," "Orbit Theory," "Fluid Theory," and "Plasma Kinetic Theory," respectively, and deal with the foundations of the subject. The last four chapters touch on some limited features of research applications and are entitled "Magnetic Confinement of Plasma," "Astrophysical Plasma," "Superdense Plasma," and "Computational Plasma Physics."

To my mind, these last four chapters are the most successful part of the book. I can well imagine a graduate student hungering for more after reading about magnetic confinement ideas or the solar wind and magnetopause or laser pellet compression. As I stated earlier, the writing style is excellent, and I particularly enjoyed these last four chapters, especially the last one on computational methods.

I thought the first four chapters were not quite as successful because the material is more mathematical and detailed and cannot be covered so well in a rapid light style. I was a bit surprised, in Chap. 2, to find no description of the particle drifts using the usual simple pictures of a varying gyration radius in crossed E and B fields or in a straight magnetic field with a perpendicular intensity gradient. Instead, the drifts are derived and discussed in a mathematical way only, using a series expansion about the guiding center. I think the student would have profited by the addition of the diagrams. There are also some annoying misprints in this chapter, on pp. 20 and 21. The treatment of δW in Chap. 3 might be a bit hard to follow, and one would benefit by seeing a simple application or two. I felt the closing section on Chew, Low, Goldberger equations was much too rushed to be comprehensible to a new reader. Chapter 4 is particularly well written, although again the discussion of Landau damping seemed rushed at the end of that section.

In summary, this is an excellent little treatise to put in the hands of an intelligent senior or graduate student who knows little about plasma physics. It is very likely to inspire him to look further into the field. It is unlikely to be of much value to the experienced plasma researcher except as a pleasant, light review. Even so (as happened to me in my reading of Chap. 8), some of the last four chapters may yield an unexpected dividend if one has not thought much about the particular topic covered in them. Those scientists or engineers who have no previous background in plasma physics may or may not find the monograph useful. I would imagine that there would be considerable frustration at several points in the first four chapters, where the discussion moves rapidly and lightly over some really complex points.

All in all, this is a good book for the audience it aims at.

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About the Reviewer: Albert Simon returns to these columns with a review of another writing in the field of one of his long-standing interests, initiated more than a score of years ago at the Oak Ridge National Laboratory and followed by associations at General Atomic and the University of Rochester, where he currently holds a professorship in mechanical and aerospace sciences and is chairman of the department. Interspersed in this career have been a Guggenheim Fellowship in Denmark and a Senior Visiting Fellowship at Oxford, plus a sabbatical at the Institute for Advanced Study. Dr. Simon's graduate studies were at Rochester.

Two-Phase Flow and Heat Transfer. By D. Butterworth and G. F. Hewitt, Eds. Oxford University Press, New York (1977). 514 pp. $32.00.

This recent addition to the rapidly growing literature on two-phase flow and heat transfer derives from a series of lectures given at the Harwell and Winfrith Laboratories of the U.K. Atomic Energy Research Group. These establishments, as those familiar with two-phase flow are aware, have made numerous significant contributions to this field in such areas as annular two-phase flow, critical heat flux (CHF), boiling and condensation, and two-phase pressure drop methods. Introductory in nature, the volume benefits from clarity and an evenness of presentation and does not suffer from a surfeit of detail. These qualities attest to the editors' care in assembling the material. The latter quality is important in dispelling the notion that two-phase flow analysis is based only on a selection of arbitrary correlations. This point is expanded in the