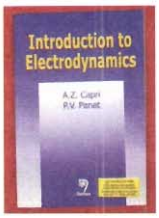
Introduction to Electrodynamics

S Chatterjee



Introduction to Electrodynamics
A Z Capri and P V Panat
Narosa Publishing House
New Delhi, 2002, pp. 465.

The first thing that any teacher of electrodynamics would do, when he (or she) comes across a new textbook on the subject, is to compare it with the immensely useful and hence popular book by J D Jackson. The book under review appears to have been strongly influenced by Jackson's book in the selection of the topics and yet the authors have put a personal stamp on the subjects they have chosen to cover. I find it particularly interesting the way they have written every electromagnetic formula in the book to accomodate both MKSI and Gaussian units. It is a common problem, when an uninitiated student tries to compare the formulae given in different textbooks, he/she invariably finds it hard to do so. I hope some curious student would look through the pages of Appendix I, which not only addresses the issue of units but also gives a feel for as to how modern techniques like the Quantum Hall effect and Josephson effect are being employed to set the standards of the fundamental constants. What I also find interesting is that throughout the book, references are given to modern topics encouraging enthusiastic students to undertake further reading. On the whole, the book is self-contained and would indeed prove very useful to the students of Indian universities. Perhaps the authors kept in mind the problems faced by students in the less privileged institutions and hence introduced some vector calculus to start with in Chapter I, although the material is expected to be covered in the BSc classes. In subsequent chapters boundary-value problems have been addressed with sufficient attention and clarity. I appreciate the large number of figures that the authors have incorporated. The problems at the end of each chapter have also been carefully chosen, showing wide applications of electrodynamics.

I find the section on Electrical and Magnetic Properties of Materials to be particularly interesting. The authors have given a lot of attention in describing the systems. To understand some of the concepts, results from quantum mechanics and statistical physics have been used. The formulae are also accompanied by 'numbers', a practice that needs to be appreciated by students and teachers alike.

Since the book is supposed to be an introduction to the subject of electrodynamics, it was not expected to be exhaustive. However, the inclusion of just a few more topics would have satisfied my idea of a desired completeness of an otherwise well-written and comprehensive text. Firstly, the idea on molecular forces should have been introduced in the chapter on dielectrics. In Chapter 13, the concepts of synchrotron radiation (only

mentioned) and transition radiation could have been introduced.

A section on wave propagation in plasmas would also have been appropriate, in view of the fact that dispersion relations are already introduced in Chapter 9. These comments, however, in no way diminish the present reviewer's appreciation of the book. In fact, he would like to use the text as an important resource material for a course on electromagnetism that he is planning to teach in future.

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Think It Over

This section of *Resonance* presents thought-provoking questions, and discusses answers a few months later. Readers are invited to send new questions, solutions to old ones and comments, to 'Think It Over', *Resonance*, Indian Academy of Sciences, Bangalore 560 080. Items illustrating ideas and concepts will generally be chosen.

Colliding Projectiles

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A particle 1 is projected from a point of position vector $\overrightarrow{r_0}$ with velocity $\overrightarrow{u_0}$. After a lapse of time T another projectile, say, particle 2 is projected from a point of position vector $\overrightarrow{R_0}$ with velocity $\overrightarrow{v_0}$ to pursue the former projectile. Find the condition required to be fulfilled for a collision between the two projectiles. Also, find where and when they will collide. Neglect the air-resistance.