Also available from Prentice-Hall: Englewood Cliffs, NJ, 1990. ISBN: 9780132489805.

Solutions Manual

Electromagnetic Fields and Energy

Hermann A. Haus

James R. Melcher

Massachusetts Institute of Technology

PRENTICE HALL, Englewood Cliffs, New Jersey 07632

PREFACE TO SOLUTION MANUAL

We are fortunate that electromagnetic aspects of engineering systems are accurately described by remarkably concise and general laws. Yet, a price paid for the generality of Maxwell's equations is the effort required to make these laws of practical use to the engineer who is not only analyzing, but synthesizing and inventing. Key to the maturation of an engineer who hopes to use a basic background in electromagnetic fields for effectively dealing with complex problems is working out examples that strike the right balance among a number of interrelated objectives. First, even in the beginning, the examples should couch the development of skill in using the mathematical language of field theory in physical terms. Second, while being no more mathematically involved then required to make the point, they should collectively give insight into the key phenomena implied by the general laws. This means that they have to be sufficiently realistic to at least be physically demonstrable and at best of practical interest. Third, as the student works out a series of examples, they should form the basis for having an overview of electromagnetics, hopefully helping to achieve an early maturity in applying the general laws.

In teaching this subject at MIT, we have placed a heavy emphasis on working out examples, basing as much as 40 percent of a student's grade on homework solutions. Because new problems must then be generated each term, this emphasis has mandated a continual search and development, stimulated by faculty and graduate student teaching assistant colleagues. Some of these problems have become the "examples," worked out in the text. These have in turn determined the development of the demonstrations, also described in the text (and available on video tape through the authors). The problems given at the ends of chapters in the text and worked out in this manual do not include still other combinations of geometries, models and physical phonemena. These combinations become apparent when the examples and problems from one chapter are compared with those from another. A review of the example summaries given in Chap. 15 will make evident some of these opportunities for problem creation.

After about two decades, the number of faculty and teaching assistants who have made contributions, at least by preparing the official solutions during a given term, probably exceeds 100, so individual recognition is not appropriate. Preliminary versions of solutions for several chapters were prepared by Rayomond H. Kotwal while he was a teaching assistant. However, finally, the authors shared responsibility for writing up the solutions. Corrections to the inevitable errors would be appreciated.

Our view that an apprenticeship of problem solving is essential to learning field theory is reflected in the care which has been taken in preparing this solution manual. This was only possible because Ms. Cindy Kopf not only "Tex't" the manual (as she did the text itself) while taking major responsibility for the art-work, but organized and produced the camera-ready copy as well. The "Tex macros" were written by Ms. Amy Hendrickson.