Second Edition

ELECTROMAGNETIC FIELDS AND WAVES

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Contents

3

ELECTROSTATIC FIELDS II 91

Dielectric Materials

11

PROPAGATION OF ELECTROMAGNETIC WAVES I 459

12

PROPAGATION OF ELECTROMAGNETIC WAVES II 504

Reflection and Refraction

13

PROPAGATION OF ELECTROMAGNETIC WAVES III 557

Guided Waves

14

RADIATION OF ELECTROMAGNETIC WAVES 595

Preface

This is a revised version of *Introduction to Electromagnetic Fields and Waves* by the same authors. The general level is unchanged, despite the fact that the phrase "Introduction to" has been omitted in the title.

Like the first edition, this book is intended primarily for students who have had at least one full course in electricity and magnetism, and one full course in calculus, including an introduction to differential equations. It should also be useful for scientists and engineers who wish to review the subject.

The major change has been the addition of two chapters on relativity. *Those who are pressed for time may omit these without losing continuity.* The other chapters have been largely rewritten, with many additions and deletions. There are about 100 new figures; as in the first edition, three-dimensional objects and phenomena are represented as such, and the field maps (such as those in Chapter 4) have been plotted on a computer. Most of the 140 examples and most of the 413 problems are new.

The aim of this book is to give the reader a working knowledge of the basic concepts of electromagnetism. Indeed, as Alfred North Whitehead stated, half a century ago, "Education is the acquisition of the art of the *utilization* of knowledge." This explains the relatively large number of examples and problems. It also explains why we have covered fewer subjects more thoroughly. For instance, Laplace's equation is solved in rectangular and in spherical coordinates, but not in cylindrical coordinates.

CONTENTS

So as to reduce the mathematical requirements, we have included a chapter on vectors (Chapter 1), a discussion of Legendre's differential equation