

PREFACE

The main purpose of this book is to connect the standard introductory undergraduate course in physics with advances in modern science and technology. The first part of the book (Chapters 1–4) gives a very brief review of selected “hot” topics in modern physics and technology. The second part of the book (Chapters 5–7) includes problems at the introductory level of undergraduate physics, which are related to various hot topics of contemporary science. We emphasize that students can solve these problems without any knowledge of modern physics. They do not have to read the first part of the book. However, if a particular problem stimulates a student’s curiosity, he or she may open the first part of the book to get a brief general tutorial on the subject. We hope that our book will help to revive interest in undergraduate physics and will help students to adjust their knowledge to advancing technology.

A huge chasm has developed between modern science and undergraduate education. The result of this chasm is that students who are graduating from college are unable to exploit the many opportunities offered by modern science and technology. Consequently, student interest in undergraduate physics is very low.

We propose to try to bridge this chasm between modern science and technology and undergraduate education. Modern science and technology widely uses the methods of classical physics, but these modern applications are not reflected in the problems on physics often suggested to students. Solving practical problems is a very effective way to inform students about contemporary science, to show the important relationships between modern and classical physics, and to prepare them for future activity in the modern technological environment.

We have prepared a set of problems based on some of the latest development in science and technology which can be solved using the classical physics accessible in a standard undergraduate program. We did this work in the Introductory Design and Science (IDS) Depart-

ment of the Polytechnic University (New York) in cooperation with Los Alamos National Laboratory (LANL). Polytechnic University is one of the oldest technical Universities in the country, widely recognized as an excellent center for undergraduate education. The IDS Department at Polytechnic University was created to develop new approaches in scientific education. LANL is widely known as one of the outstanding research centers in the world and it has an active program to promote undergraduate science education.

L. M. Folan, V. I. Tsifrinovich and G. P. Berman

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