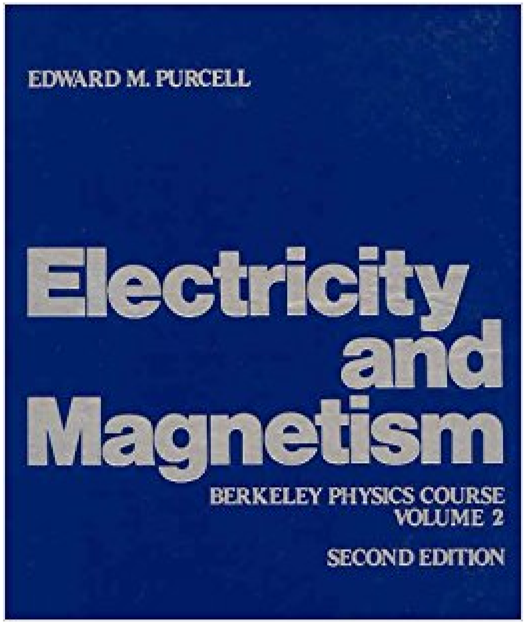
Electricity And Magnetism (Berkeley Physics Course, Vol. 2)



Synopsis

The sequence of topics covered include: electrostatics; steady currents; magnetic field; electromagnetic induction; and electric and magnetic polarization in matter. Taking a nontraditional approach, students focus on fundamental questions from different frames of reference. Each chapter has figures and problems to apply concepts studied.

Book Information

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Customer Reviews

This book is really an intro to E&M but it is very dense with verbal descriptions of the physics involved. For that reason even though it seems light on equations it is fairly heavy reading.There are plenty of diagrams and interesting situations. Rather than just throw out a few equations and work an example the author goes into great detail in describing the physics of a situation. I think it is a very useful book for that reason.This is not the sort of text you can scan through to find an equation and then plug and chug some numbers. It requires actually reading the chapters to get the gist of what he’s saying. It would be better paired with a book heavy on equations and examples and light on verbal descriptions rather than used stand alone.The real gem in the book is the derivation of the magnetic field from Special Relativity. This is something that should be standard in E&M texts but seems to be missing in most of them.

this is a great text for learning the basics of electricity and magnetism. That’s the bottom line. I would recommend this book to any EM student and encourage them to read it before the course starts.

The standard for all levels from undergrad on up

I’ve been searching for a RIGOROUS textbook on special relativity and electro-magnetism for a long time. This book is by far the best I have found!

This is a best-of-breed book. Its highlight is the extensive use of relativity to develop the idea of electromagnetism as the first unified field theory. Although the book does present the mathematical tools of vector calculus from scratch, it is clearly designed for students who are physics majors, have had a substantial high school physics course, and have had strong mathematical preparation. I would not dare to use this book to teach an E&M course to a less elite audience.The use of cgs units in this book is IMO a nuisance. Given the book’s emphasis on relativity as a link between electricity and magnetism, it’s nice to use a system in which E and B have the same units. However, I prefer to handle this by using SI units and writing Maxwell’s equations with the coupling constants expressed as k and k/c^2, which makes the relativistic links almost as evident and allows a much easier connection with practical laboratory measurements.The book is extremely old, and although Maxwell’s equations haven’t changed, some of the discussion of experimental evidence, e.g., bounds on the non-neutrality of the hydrogen atom, are many decades out of date.

That this book is still in print is a testament to its popularity in the teaching of electromagnetic theory at the undergraduate level. Not only being popular, it is also a book of high quality and is packed full of the insights that are needed for students at this level. The only thing missing from the book, because of its age, is the inclusion of computer algorithms and code to solve problems in this subject. All physics textbooks in the 21st century should include the use of the computer so as to introduce the student to what is now the predominant way of solving problems in physics. The use of numerical methods in physics will continue to increase in the decades ahead, and students need to be exposed to these methods as early as possible. The author gives good descriptions of the vector calculus needed for a study of electromagnetism. The divergence of a vector function, Gauss’s theorem, the curl of a vector function, and Stoke’s theorem are all treated in detail, with diagrams employed at every step to reinforce the student’s intuition. It is very important at this level to make sure the student understand these concepts in depth, as it will make the learning and appreciation of differential forms much easier in later courses in physics. Too often, vector calculus is presented to physics students as a formal construction, and the use of pictures is eschewed. Thankfully this author has not chosen this approach. In addition, in his discussion of the fields of moving charges, the author prepares the student for the special theory of relativity. An interesting thought experiment is given for illustrating the invariance of charge. A description is also given of the experiment of Henry Rowland, which in the 19th century detected the magnetic field of a charged rotating disk, thus supporting the theory of Maxwell. The Hall effect, of tremendous importance technologically, is described in detail. The famous "jumping ring" demonstration of Lenz’s law is discussed also.

This book must have been a work of love. The reader of it who fails to fall in love with electromagnetism would better change his direction of study, as he will not find anything better, including the marvellous Feynman’s "Lectures on Physics". Following a more-or-less historical approach, except for the early use of relativity, the author strives to get the results from a full understanding of the physical situation. This is obtained by the use of very clever intuitive models. After that comes the mathematics, rendered natural and welcome. An outstanding example is the treatment of polarization of a dielectric sphere, where most of the physics is derived from a drawing! Another feature, to be found only in books written by great physicists, is the ability of stretching the argument up to its limit, getting results we wouldn’t think possible with so little formalism. Problems are extremely good and real. The drawings, done by the author himself (so I read some! where) are very beautiful and helpful. Some of the exercises are of numerical character, motivating the use of computers. After meeting this book I could never teach introductory electromagnetism from another text. The author, Edward Purcell, is a Nobel prize winner who discovered, among many other things, nuclear magnetic resonance.

Electricity and Magnetism (Learn Physics with Calculus Step-by-Step) (Volume 2) Essential Trig-based Physics Study Guide Workbook: Electricity and Magnetism (Learn Physics Step-by-Step Book 2) A Student's Guide Through the Great Physics Texts: Volume III: Electricity, Magnetism and Light: 3 (Undergraduate Lecture Notes in Physics) Glencoe Physical iScience Modules: Electricity and Magnetism, Grade 8, Student Edition (GLEN SCI: ELECTRICITY/MAGNETIS) Shocking! Where Does Electricity Come From? Electricity and Electronics for Kids - Children's Electricity & Electronics 25 Uses of Electricity 4th Grade Electricity Kids Book | Electricity & Electronics Understanding Physics (Motion, Sound, and Heat / Light, Magnetism, and Electricity / The Electron, Proton, and Neutron) RealTime Physics Active Learning Laboratories, Module 3: Electricity and Magnetism Workshop Physics Activity Guide, Module 4: Electricity and Magnetism Electricity and Magnetism: Experiments in Physics Waves, Electricity and Magnetism: Experiments in Physics FlipItPhysics for University Physics: Electricity and Magnetism (Volume Two) Understanding Physics: Volume 2: Light, Magnetism and Electricity