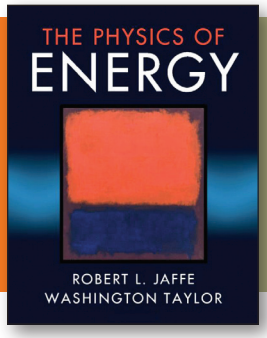


The Physics of Energy

Robert L. Jaffe and Washington Taylor

Cambridge University Press, 2018
894 pages, $79.99 (e-book $38.49)
ISBN 9781107016651

The Physics of Energy, at 874 pages and weighing in at almost six pounds, is the most comprehensive book on energy that I have ever seen. The book is the product of decades of energy and physics classes taught by theoretical physics professors Robert Jaffe and Washington Taylor at the Massachusetts Institute of Technology. Jaffe and Taylor are clearly passionate about physics, and the result is a fantastically thorough and detailed evaluation of the underpinnings of energy and energy systems from a physics perspective.

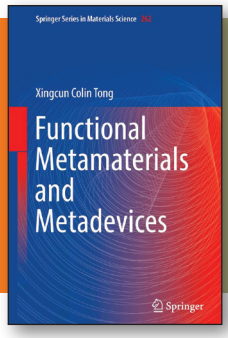
The book has three parts, broken out into 38 chapters and 185 subchapters. Each chapter concludes with a discussion and investigation questions and problems. Chapters are dense with information, but call out physics principles, use illustrations to describe concepts, and have examples with answers to further expand upon and explain concepts. While the technical content of the book is daunting, it is highly approachable. Part I covers Basic Energy Physics and Uses, with the expected topics of mechanical and electromagnetic energy, waves and light, and thermodynamics. Unexpected is a chapter on quantum physics, which the authors warn the reader will need to understand the nuclear energy topics in Part II. Each of the physics concepts is explained with great clarity as applied to tangible concepts, such as energy used while driving a car.

Part II is dedicated to all aspects of Energy Sources, with chapters on nuclear, solar, biological, ocean, wind, and geothermal energy plus fossil fuels. Again, each chapter contains relevant information, specifically the math and physics to break down each topic in an accessible manner, and then explains the relevant application in energy.

Part III on Energy Systems Issues and Externalities contains a disjointed range of topics—from climate change to energy storage—and includes an additional chapter on the thermodynamics of energy efficiency. My only criticism is that "hot" topics, such as electrification of automobiles with lithium-ion batteries and fuel cells, are handled lightly in the energy-storage chapter. Fortunately, each chapter in this part, and throughout the book, stands on its own, so one or two weak chapters in no way diminishes the overall effort.

I see several uses for this book. It can serve as a textbook for senior college undergraduate students and graduate students to learn about energy. The content is broad and thorough and could be used by scientists, engineers, and policy experts with a strong background in physics. The book can also be used to teach introductory and second-level physics. I will keep *The Physics of Energy* in my office to serve as a desk reference for energy concepts. With 185 topics plus appendices on basic concepts in physics and math, this will likely become a standard book, serving as a valued and fundamental resource to professors, students, and practitioners.

***Reviewer: Karen Swider Lyons**, US Naval Research Laboratory.*



Functional Metamaterials and Metadevices

Xingcun Colin Tong

Springer, 2018
277 pages, $159.99 (e-book $119.00)
ISBN 978–3-319–66043–1

Functional Metamaterials and Metadevices is a book that contains basic and advanced knowledge about metamaterials. The book is easy to read, but it is also very specialized, so it is recommended for students, scientists, and engineers in materials, electronics, optics, mechanics, acoustics, telecommunications, or related areas, as well as those who wish to be aware of the state of the art of these fields.

The book is well explained and illustrated, containing a large number of images, figures, graphs, and equations, which help the reader to quickly and adequately understand the text.

Moreover, it can also be very useful for those who are looking for very specific information about any type of metamaterial. The book explains, in a friendly, clear, and concise manner, the fundamental principles of metamaterials and metadevices. Their design, manufacture, and applications are also described according to the classifications established by the author. His classifications are useful and adequate, and they allow the reader to clearly appreciate the interesting world of metamaterials.

In the 12 chapters in this book, the reader will be able to identify the great technological potential associated with the use and application of metamaterials. The author presents a wide variety of current technological examples, as well as those of everyday applications.

The first chapter is an introduction to Metamaterials and Metadevices. It contains the fundamental concepts for the proper understanding of the structure and performance of these materials. It

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