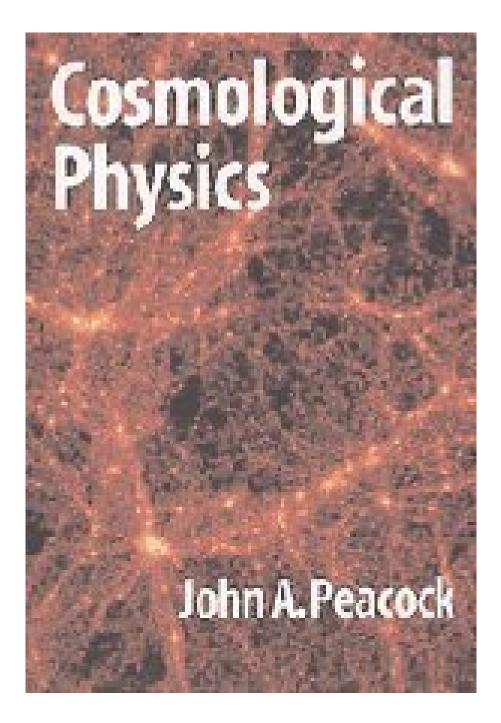


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Review

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This textbook provides advanced undergraduate and graduate students with a complete introduction to modern cosmology. It successfully bridges the gap between undergraduate and advanced graduate texts by discussing topics of current research, starting from first principles. Throughout this authoritative volume, emphasis is given to the simplest, most intuitive explanation for key equations used by researchers. The first third of the book carefully develops the necessary background in general relativity and quantum fields. The rest of the book then provides self-contained accounts of all the key topics in contemporary cosmology, including inflation, topological defects, gravitational lensing, galaxy formation, large-scale structure and the distance scale. To aid understanding, the book is well illustrated with helpful figures and includes outline solutions to more than ninety problems. All necessary astronomical jargon is clearly explained, ensuring the book is self-contained for any student with undergraduate physics.

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About the Author Peacock, Royal Observatory, Edinburgh, UK.

Most helpful customer reviews

23 of 26 people found the following review helpful.

Borrow it first.

By Andy Gregory

I got this book on short term inter-library loan hoping to further my knowledge of inflationary cosmology. I don't think that this is a suitable volume from which to begin study of this topic unless you have a supervisor on hand for occasional help. The chapter on inflation for example summarises standard results. I found derivations of these not to be explained fully enough for a first encounter. The derivation of the basic equations of motion for the scalar field cosmologies from the Lagrangian is an example. The slow -roll parameters and their relationship to the Friedmann equations are summarised - (a much fuller discussion of these is given in Scott Watson's e -book - see below). This sometimes terse approach can make the book heavy going for people like me working on their own for 'fun'. I did enjoy the chapter though as I had already studied a lot of the material using John Norbury's e-book 'General Relativity'(pdf and html available contains quite a few errors but inflation is very clearly explained), Scott Watson's (pdf/html)'Exposition on inflationary cosmology'and numerous preprints from the e-archives. With mastery of this material under my belt I therefore found Peacock's material on this topic readable and enjoyable although I did not learn anything new from it. The problems (and solution hints) were good. I enjoyed the chapters on the rudiments of GR (being already very familiar with this albeit from long ago)but again the treatment is brief and constitutes a review rather than a place to start learning GR from.

Dipping into the chapters of material new to me, I could see little hope of personal progress here using this book as a starting point. I realise however that the book covers a huge amount of varied material much of which has been developed in the last twenty years and the book needs to be kept to a sensible size.My perspective is that of someone dabbling independently in their sparetime twenty years after leaving university. I daresay a beginning PhD student might view it in a different light.

8 of 8 people found the following review helpful.

A poor but well-written presentation of a broad subject; difficult for any student to learn from By JDG

First the good:

Peacock clearly knows his subject, and he is a good writer. His prose is well-constructed and easy to read. This text makes a good reference, with important results placed in easy-to-find boxes and tables of cosmological values and formulae in the back.

This book's problem stems more from its presentation of ideas. The publisher's foreword states, "The essential concepts and key equations used by professional researchers in both theoretical and observational cosmology are derived and explained from first principles... the book is self-contained for students with a background in undergraduate physics." These statements are laughable.

Even the more rigorous of Peacock's derivations jump large chunks of reasoning and mathematics; most rely largely on vague arguments (frequently by the author's own admission). One may accept the results of such derivations, but it is difficult to gain a true understanding of the physics involved. It is nearly impossible to then apply these results to cases that differ from the specific assumptions made by the author.

The exercises the author includes frequently rely on the student to make similar leaps of logic. For example, Peacock provides a plausible derivation of the form of the stress-energy tensor for a perfect fluid, but not for any other case. He then asks the student to consider cases such as rotating mass shells; the hint provided for this problem assumes that the student can simply infer what the stress-energy tensor is in this case without any guidance whatsoever. Time after time while taking a course using this textbook, I found myself sitting in a room full of physics graduate students who, even after having watched a professor attempt to solve the problems and having read the hints provided, could not for the life of us figure out what in God's name was going through Peacock's head when he decided that these problems were appropriate and instructive. Many of the students I worked with were quite bright, and we were unable to solve a clear majority of the exercises we were assigned from this textbook.

Another part of the problem is that, contrary to claims, Peacock's presentation requires a great deal of background. Many cases, both derivations and exercises, require a mastery of classical mechanics or solid understanding of thermodynamics and fluid mechanics. A good example is problem 2.1, which requires familiarity with the concept of a "jump condition" (Peacock does not define this) and familiarity with the use of the Rankine-Hugonot relations, a concept one would only have heard from a fluid dynamics course (Peacock does not mention them). The hint given for this problem assumes a knowledge of enthalpy (a concept that is defined only in passing and in a very specific form; the word "enthalpy" is not in the index) and what an adiabat is (Peacock defines a specific adiabat within the hint, but this does little good without a general definition of the word). Given the information provided in the text, the problem and its solution are entirely nonsensical.

The existence of this textbook is an excellent example of an author who has mastered his subject to the extent that he no longer has any perception of how a reader could fail to understand it. This prevents him from being any sort of effective instructor. If you wish to learn cosmology, I recommend against this book. If you are an instructor considering using the book for a course, then for the sake of your students I strongly urge you to look elsewhere.

12 of 16 people found the following review helpful.

Excellent book.

By Jill Bechtold

Very lucid and up-to-date description of cosmology and relativity, with the right balance of qualitative discussion, presentation of the important observations, and mathematical formalism.

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