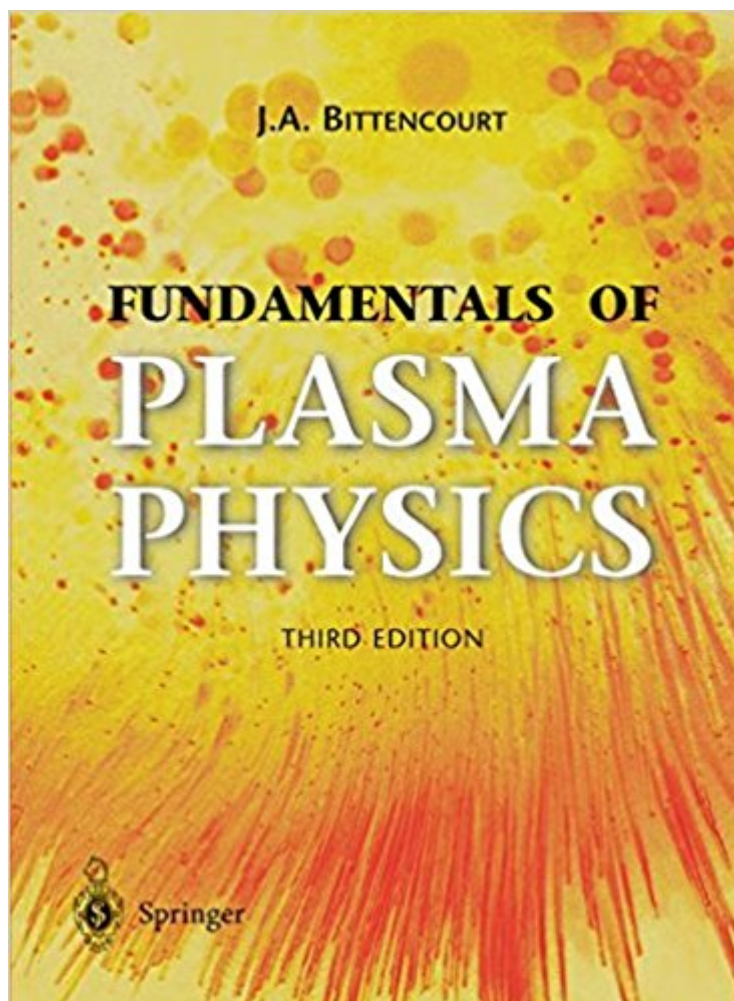


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# Fundamentals Of Plasma Physics



## Synopsis

Fundamentals of Plasma Physics is a general introduction designed to present a comprehensive, logical and unified treatment of the fundamentals of plasma physics based on statistical kinetic theory, with applications to a variety of important plasma phenomena. Its clarity and completeness makes the text suitable for self-learning and for self-paced courses. Throughout the text the emphasis is on clarity, rather than formality, the various derivations are explained in detail and, wherever possible, the physical interpretations are emphasized. The mathematical treatment is set out in great detail, carrying out the steps which are usually left to the reader. The problems form an integral part of the text and most of them were designed in such a way as to provide a guideline, stating intermediate steps with answers.

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## Customer Reviews

From the reviews of the third edition: "This is an excellent introductory textbook of plasma physics, especially recommendable to those starting the study of the subject.  $\hat{\mathcal{A}}$  the book is an immense monography of 678 pages. Our impressions are good  $\hat{\mathcal{A}}$ ." (Iv $\hat{f}$ in Abonyi, Zentralblatt MATH, Vol. 1084, 2006)

Fundamentals of Plasma Physics is a  $\hat{\mathcal{A}}$  comprehensive textbook designed to present a logical and unified treatment of the fundamentals of plasma physics based on statistical kinetic theory, with applications to a variety of important plasma phenomena. The clarity and completeness of the text makes it suitable for self-learning. Throughout the text the emphasis is on clarity, rather than

formality. The various derivations are explained in detail and, wherever possible, the physical interpretations are emphasized. The mathematical treatment is set out in great detail, carrying out the steps that are usually left to the reader. The problems form an integral part of the text and most of them were designed in such a way as to provide a guideline for the student, stating intermediate steps with answers. The book is intended primarily for advanced undergraduate and first year graduate students meeting the subject of plasma physics for the first time and is suitable for those who have taken classical mechanics, electrodynamics and mathematics beyond sophomore level. It is a valuable compendium for any serious student of plasma physics at the level of research student or research worker and it is also of interest to researchers in other related fields, such as space physics and applied electromagnetism.

When I first saw this book, several years ago, I browsed it and dismissed it because I considered there was nothing new about it that couldn't be found in other classic textbooks on plasma physics, and it didn't get deep enough for a graduate course. However, as I sent it to the library, I found many students found it useful as an introductory book, because it's very easy to read. Except for the last chapter, it's very well written. I nowadays recommend it strongly for self-study, specially to under-grads.

The book presents a well rounded introduction to plasma physics and related phenomena. The book includes discussions about both space and laboratory plasmas. The does a good job of thoroughly explaining concepts from both physical and mathematical points of view, which is very useful for a physicist. The book lacks the following: 1 a discussion of nonlinear wave steepening and shock phenomena 2 citations to relevant research articles or other sources of information. However, the I would not suggest that the lack of these two components makes the book unworthy of a plasma physicists interest. In fact, I would highly recommend this book for any advanced undergraduate or beginning graduate level student. It provides useful background and explanations for phenomena that is often glossed over or discussions that typically get swept under the rug.

I'm currently a student working in plasma research facility. I had a problem in the fact that I could not take the plasma physics course that is offered here for scheduling reasons. I therefor needed a book that has all the basics of plasma physics, yet is simple enough that i could teach myself this field of physics. This books is exactly that. For any student with a good background in electricity and magnetism, this book will pick up right from the maxwell equations and derives all the needed

equations quite explicitly making the reading much easier to follow. Also, the good thing about this book is the sheer amount of material it covers on the topic. It contains all the basics an undergraduate needs to know and even for graduate students, it is a great read. It is well written and never boring. For its explicitness and its broadness of topics, I absolutely recommend this book.

This book does what it claims, all of the fundamentals of plasma physics are laid out with good logical continuity. A complete undergraduate background in physics is assumed, but you can't really do plasmas without that. In particular the chapters on plasma waves are much more complete than any other low level plasma book I've seen and the treatment is better than most standard graduate level texts. Cold, warm and hot plasma models, good treatment of Landau Damping etc.

I have worked through a self study/directed reading course with this book and I can say that I enjoyed it. I think the statement made in the description of the book about 'emphasizing physical meaning' more than formality is a bit of a stretch. The book does have a great reading flow, but there are many times where just a short sentence detailing the geometric/physical meaning would make the reading go by so much faster. There were a few times where I had to spend 30+ minutes straightening out a claim made by the author that would have been resolved in two minutes with another sentence and some reflection on my part. With that said, this book is still in the top tier of any physics book I have read, not the best, but it is still done very well. I enjoyed the detail that was gone into in the mathematical development - there is not much hand waving here. The bottom line is, if you are looking for a detailed mathematical approach to plasma physics (heavy calculus), this might be your book.

I am a PhD student in Electrical Engineering, focussing on plasma physics. I have access to a lot of text books, and normally you find that one book is good for topic A, but not so good for topic B. However, in this book I could find all the topics that were of interest to me (in particular the Boltzmann equation and its moments), well-written and easy to understand. Calculations are easy to follow and normally are explained by physical explanations using text and figures. The notation is reader-friendly, tensor analysis is avoided by using indices instead. The book is a text book, so one should not expect the latest and most detailed science results, or derivations "from scratch" (like the BBGKY hierarchy). Instead, the reader should expect a solid and detailed introductory text into plasma physics that covers a large amount of topics. To conclude, I can only recommend this book to every grad or undergrad student looking for a book to start with, or to brush up on some basics.

This text was not what I was expecting. My interest is in semiconductors and I was looking for an introductory textbook on the physics underlying different types of plasma processing which could serve as an updated version of Glow Discharge Processes by Chapman. This text has very little to do with applications and consists largely of page after page of calculus. My interest is in semiconductor processing which is not mentioned in the section on applications: Chapter 1 section 4. Do not buy this unless your understanding of advanced calculus is very solid.

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