long section is devoted to the electromagnetic conditions within matter.

The third chapter is a very good and concise summary of the elasticity of solid bodies, including the stress and strain tensors, the stress–strain relationship and stresses in dielectric and magnetic bodies. The discussion in this section is interesting and shows quite well the effects of magnetization on Young's modulus.

The fourth chapter discusses microscopic and macroscopic electromagnetic theories of physics, and there is a short section on solid-state physics. The discussions throughout this chapter are very useful, even though the reader is once again given the magnetic rather than the electrical case. The author explains that this approach is the simpler and much more readily provable case. The last two chapters deal with the prediction of the uniform and nonuniform strain tensor. For the latter, the development is, as one might expect, mathematically rather complicated. At various points in the book there is discussion of the magnetostriction phenomenon.

Altogether the presentation is a good one, the notation is standard, and the approach is straightforward. There are a few problems at the end of each of the six chapters, as Birss intends the book to be used in the classroom. It would appear, however, that the book's greatest use might be for a senior honors seminar or an intermediate graduate seminar. For such purposes the book could provide further depth to the initial upper-level electricity and magnetism course.

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Hydrodynamic stability

STABILITY OF PARALLEL FLOWS. By Robert Betchov and William O. Criminale Jr. 330 pp. Academic Press, New York, 1967. $16.00

by JOSEPH GILLIS

It is perhaps natural that most people who have ever thought seriously about fluid flow have sooner or later come to recognize the central significance of stability. Leonardo da Vinci, who was deeply interested in flight problems, filled a notebook with drawings of turbulence. That great kite-flier, Benjamin Franklin, made some acutely perceptive remarks on stability. In the following century George G. Stokes, William T. Kelvin and John W. S. Rayleigh gave the subject a genuine theoretical basis, using the methods of their time, that is, separation of variables.

The development was continued in the present century by James H. Jeans, Rayleigh, Arnold J. W. Sommerfeld, Subrahmanyan Chandrasekhar and others. Chandrasekhar's book, published in 1961, is a monumental account of the then state of the art of linear-stability theory, and his volume seemed to be the last word on the subject. However, science moves on, and during the present decade the question of hydrodynamic stability has assumed a new and wider interest. This is mainly because of the development of nonlinear theory, initiated by Stuart and others during the late 1950's and made possible by the advent of high-speed computers. The new insights gained from the work of Stuart and others have in turn made possible substantial advances in the linear theory itself.

The new monograph by Robert Betchov and William O. Criminale attempts to sum up the present situation in parallel flows. The book begins with a careful formulation of the linear problem for two-dimensional flows, beginning with the general equations and developing a few special inviscid cases. These are used particularly to illustrate the basic physical mechanisms. The remainder of part one deals with standard two-dimensional problems of viscous parallel flow, boundary layers, channel flows, jets and wakes. I particularly welcome the concluding chapter of this part wherein computer methods are described in some detail.

The second part of the book presents a complete picture of the general problem. The basic theory and standard methods of analysis are carefully explained and related to experimental facts. Nonlinear problems are included, and there is also a long chapter on magnetohydrodynamic effects. An interesting final chapter is devoted to miscellaneous modern topics, including the complication of flexible boundaries, relevant both to problems of aerodynamic flutter and blood flow, and a short note on dusty gases.

Apart from the broad and clear presentation of the main problems, the book is also rich in incidental and illuminating information. The mathematical argument is careful and clear throughout and includes all the recent developments in the subject. There is a beautiful appendix explaining an analytic approach to the Orr–Sommerfeld equation through the method of inner and outer expansions. In this case the problem of matching the expansions is shown to be equivalent to that of finding a suitable path for a complex integration.

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Closer to field theory

PARTICLES AND FIELDS. By David Lurié. 506 pp. Wiley, New York, 1968. $15.00

by JEREMY BERNSTEIN

As a guide to prospective consumers I would like to propose that all books containing the words "particle" or "field" or both in their titles be given a content rating defined by the expression $a \times$ "particle" $+ b \times$ "field" where a and b are presumably positive numbers whose sum adds up to unity. This rating has no pejorative intent but should serve to warn the reader that the book he is about to buy, or order for his class, is either a book about phenomenological particle physics or formal field theory or a mixture. (The table below indicates my rating of a few of the books in this field.)

David Lurié's new book is called *Particles and Fields.* Despite this title I would put a for this book close to zero, according to my rating system, and b close to one, because the reader is presumed to know the phenomenology of elementary-particle physics. Although the nucleon–electromagnetic form factors are defined in terms of the one-particle matrix elements of the electromagnetic current, we are not told how they look experimentally or indeed how to go about computing them in various models. (I was a little puzzled in this discussion because in counting up the number of independent Lorentz vectors that can be made out of the Dirac matrices and two four-momenta, Lurié finds only five and I believe there are twelve.) Dispersion relations are not discussed at