

REVIEWS

Convective Stability of Incompressible Fluids. By G. Z. GERSHUNI and E. M. ZHUKOVITSKII. Translated from the Russian by D. LOUVISH. Keter Publications, Jerusalem/Wiley, 1976. 330 pp. £24.00.

This translation of a book originally published in Moscow in 1972 is a welcome guide to the Russian literature on thermal convection. Although translation journals have improved our access to the work by Russian authors, the full extent of their contributions to the field of thermal convection has not yet been recognized by scientists in the West. While the book by Gershuni & Zhukovitskii emphasizes those areas in which Soviet scientists have been strong traditionally, it succeeds in giving equitable coverage to the entire field of thermal convection.

Like the well-known treatise *Hydrodynamic and Hydromagnetic Stability* by S. Chandrasekhar, the book considers primarily linear problems of convective instability. In contrast to the astro- and geophysically motivated choice of problems in the former book, Gershuni & Zhukovitskii stress problems with potential engineering applications. The onset of convection in boxes, ducts and cylinders is treated extensively. Physical aspects sometimes tend to vanish behind the large variety of geometrical configurations studied and the mathematical analysis occasionally appears to be repetitive. But throughout most of the book the authors give a concise description of the problems and succeed in extracting the pertinent points in various examples. To western readers used to efficient computer calculations the methods of numerical approximation may appear crude. They are developed and applied, however, with good physical intuition and should be satisfactory for all practical purposes. Nonlinear aspects of convection have not been neglected although they are summarized rather briefly. The effects of rotation, magnetic fields, internal heating and parameter modulation are described in detail. Other topics that are given extensive coverage include convection of binary mixtures, convection in a porous medium and convection in the presence of a shear flow. In view of the wide variety of physical effects considered, the lack of a subject index is one of the most strongly felt shortcomings of the book. In the translation the remarks on recent developments have been rearranged such that they appear at the end of the respective chapters. Because of the time elapsed since the original publication one would have liked to see those remarks brought up to date. The translation by D. Louvish is competent and there appear to be few errors or misprints.

The book fills a gap in the fluid-mechanics literature since it represents the first attempt to give a comprehensive description of convective instabilities, at least as far as linear theory is concerned. The book emphasizes problems of interest to engineers but any research worker interested in particular convection phenomena will find it useful. Although the book has not been written as a textbook it may well serve that function for a course on thermal convection at the graduate level. The price is rather high for a machine type-set book and may restrict the number of individual buyers.

F. H. BUSSE

SHORTER NOTICES

Continuum Mechanics of Viscoelastic Fluids. By R. R. HUIGOL. Hindustan Publishing Corporation, Delhi, 1975. 367 pp. \$27.00.

This is a book for workers well versed in the continuum mechanics of fluids and not for beginners. It is a personal appraisal of modern theories, appreciative without being blinkered, detailed in treatment and profuse with references to recent work. For those familiar with the subject, it provides helpful insight and collects a wide variety of interesting results. The first seventy-three pages are given over to kinematics, providing an emphasis on the geometry of fluid motion that is necessary when viscoelastic constitutive equations are to be discussed. This discussion, finally embracing experimental methods, forms the substance of the book. The typesetting and printing leave much to be desired.

Dimensionless Parameters. Theory and Methodology. By H. A. BECKER. Applied Science Publishers, London, 1976. 128 pp. £8.00.

This is a verbose, some might say pretentious, essay on a topic of importance to all engineers and physical scientists. It contains a lot of semantic and historical discussion about dimensionless ratios, some short chapters on definitions and group theory that will dismay some readers quite unnecessarily and one comparatively long chapter, entitled 'The Practice of Configurational Analysis', which actually shows how to obtain relevant dimensionless parameters for seven chemical engineering processes or situations. Neither new results nor new techniques are presented. The important decisions on what are the dependent and the independent dimensionless parameters in any particular case seem to be made according to traditional and already well understood arguments. The formal structure erected by the author, though not unhelpful, is not necessary. The monograph is beautifully produced.

MHD-Flows and Turbulence. Proceedings of the Bat-Sheva International Seminar, Beersheva, March 17-20, 1975. Edited by H. BRANOVER. Israel Universities Press, Jerusalem, 1976, 161 pp. \$22.00.

This little volume contains fifteen papers (some in summary only), of which twelve are on MHD flows, both laminar and turbulent, and the remaining three relate to turbulence effects in non-conducting fluids. The main emphasis in the MHD papers is on duct flow with transverse field effects. Several of the contributions include results (in some cases preliminary) of experimental investigations. The Editor expresses the hope in the Preface that the Beersheva Seminar on MHD-Flows and Turbulence will be repeated from time to time (and plans are in fact now underway to hold the second such seminar in March 1978). It was the MHD, and in particular the concentration on problems in liquid-metal MHD of some practical importance, that evidently gave the first seminar its particular character. The papers on turbulence *per se* bear little relation to this main theme, and, given the many other meetings devoted specifically to turbulence, one wonders why the topic was included in what was inevitably a peripheral manner. Future meetings in the series might be more profitably restricted to laboratory MHD, for which few other forums are now available.

Coastal Engineering, volume 1, part 1. Editor-in-chief E. W. BIJKER. Elsevier, 1977. 96 pp. Dfl. 117.00 for one volume of four parts.

In the introductory editorial contained in volume 1 it is stated that the Journal aims to serve as a general forum for the different areas of coastal engineering. It is intended that the Journal should include documented case histories as well as papers describing theoretical research. It is also stated that discussion of published papers will be encouraged. The first issue of this new Journal appeared in March 1977 and includes one paper on beach erosion and five papers on water-wave theory.