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BOOK REVIEW

Flow Instability. By D. N. Riahi, WIT Press, Southampton and Boston, 2000. 256 pp. ISBN 1 85312 701 9. £84.00 or $126.00.

According to the cover, 'this book presents older classical theories of hydrodynamic stability as well as new developments in nonlinear stability, achieved mostly in the last three decades. It is designed for use by researchers and graduate students …' A good book of this nature would be a welcome addition to the literature; but the present one falls far short of expectations raised.

Riahi explains in his Preface that 'This book is based on the lecture notes of a graduate course, that I have developed and taught at the University of Illinois at Urbana-Champaign, since 1989.' Unfortunately, the final manuscript appears to have been put together in haste, without proper care; and reproduced, camera-ready, without adequate copy-editing or proof-reading. Misprints and basic lapses of English abound, the organisation of material is at times haphazard, and there are many obscurities of exposition. Several of the figures, taken from other publications, look like crude xerox copies of originally-clear photographs. The book highlights papers authored or co-authored by Riahi himself: of the 90 or so references from 1980 or later, about half are to Riahi's own works.

Here are just a few examples. For poor style: 'The stability (or instability) system that we consider in this book for analysis and illustrative purposes and for introduction of various techniques and procedure is a simplified system for incompressible fluid flows since nothing will be gained by considering the very lengthy compressible system for illustrative purposes' (p. 5); and the baffling 'Weakly nonlinear stability of weakly nonlinear wave solutions can be a relatively less complicated technically to show that the nonlinear interactions of such waves can be enhanced in certain cases when particular resonance conditions are satisfied' (p. 136). For misprints: integration 'in z from $-1/2$ to frac12' (p. 23); and '$i(\alpha\hat{u}\beta\hat{v}) + D\hat{w} = 0$' instead of '$i(\alpha\hat{u} + \beta\hat{v}) + D\hat{w} = 0$' for the continuity equation of wavelike modes (p. 32). Among other obvious errors: 'plane Couette flow where $u_0(z) = z \ldots, -1 \leqslant z \leqslant 1$ [with] motionless lower plate, and plane Poiseuille flow where $u_0(z) = 1 - z^2, \ldots - 1 \geqslant z \leqslant 1 \ldots$' (p. 38); and the crudely sketched figure 2.7 (p. 47) of 'Kelvin Cat's eyes pattern', which appears to show that wavelength changes with distance above and below the cats' eyes. For (dis-)organization, there are two accounts of linear Helmholtz instability (pp. 37–38 and pp. 63–64) and then a separate account of Kelvin–Helmholtz instability (pp. 78–81). Other sections, particularly in Chapters 4 and 5 on nonlinear theory and the mathematical appendices of pp. 213–223, are, for the most part, far too brief to be comprehensible even if correct.

The reputation of neither the author nor the publisher will be enhanced by this book and I cannot recommend it to anyone.

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