Chapter 3 exhibits a complete change of style. The author gives a number of interesting examples with fluid mechanical relevance showing the power of several asymptotic techniques that he has helped to develop. There is a nice description of two-scale analysis and boundary-layer methods, and a very readable and full discussion of exponential asymptotics, as applied to several problems including the Saffman-Taylor experiment. Motions of fronts and the existence of localised states are also discussed, though as yet there has been little investigation of the latter other than in simple evolution equation models. Chapter 4 deals with the nonlinear aspects of pattern-forming instabilities; those that lead to cellular structures or to travelling waves with a definite wavelength at onset. The emphasis throughout is on generality; although e.g. the particular problem of Rayleigh-Bénard instability is discussed explicitly, the main thrust is towards developing generic equations governing the various forms of pattern dynamics, and investigating which of their properties are robust and generalisable. In keeping with the book's pedagogical character, the treatment of secondary instabilities of rolls is restricted to the discussion of Eckhaus/zigzag type instabilities, which can be understood as phase instabilities arising out of translational symmetries of the primary pattern. There is no discussion of the (admittedly very complicated) 'convective textures' theories of Cross, Newell, Passot and others, which emphasise the role of weakly damped mean flows in destabilising patterns at low Prandtl numbers. Nonetheless, I found this chapter (which is the one closest to my interests), to be extremely valuable. The final article concerns flames and detonations, another subject that has not been widely disseminated in fluid mechanics texts. The authors have assembled some lovely pictures, and have given a wide ranging description of the theory, and of model equations such as that of Sivashinsky that seem to give a good description of flame fronts in a variety of situations. There is also a clear treatment of piston-type problems, though I am surprised that Lighthill's book "Waves in Fluids" which has a very thoughtful section on these problems was not given as a reference. This last chapter reads more like a review article than the others; reflecting perhaps the rapid development of the subject. Only in the future will it be possible to assign their true importance to the various models described.

In summary, I very much enjoyed reading this book, and learned much from it. While the articles are quite separate, each with its own bibliography, there is adequate cross-referencing and a global index. The quality of the English puts to shame the works of many native speakers! I expect that it will find a wide readership among theoretical hydrodynamicists, and will still be useful well into the next century.

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Asymptotic theory of separated flows, edited by **V.V. Sychev, A.I. Ruban, V.V. Sychev, G.L. Korolev** (Cambridge University Press, 1998, 334p.) £ 30.00, US$ 49.95, hardcover ISBN 0 521 45530 8.

This book seems, to this reviewer at least, to be one of the best such contributions in the area of separated flow theory. It is written by four Russian experts, all of whom were together at the central aero-hydrodynamic institute in Zhukovskii and made exciting and substantial efforts and progress in the area over many years. The successive chapter headings indicate the scope and emphasis of the presentation: the theory of separation from a smooth surface; flow separation from corners of a body contour; flow in the vicinity of the trailing edge of a thin airfoil; separation at the leading edge of a thin airfoil; the theory of unsteady separation; the asymptotic theory of flow past blunt bodies; numerical methods for solving the equations of interaction. The beautiful theory(ies) and computation(s) of separation are decribed very well in excellent English.

The review had to search hard for aspects which might, or should, be criticised/questioned. First, is the scope fairly comprehensive and are the quoted references readily available? The answer appears to be yes, by and large (see also the fifth point below). Excellent Russian of Soviet works in the area are included, of course and as necessary, along with excellent Western ones; the most important of the latter in the literature are mostly incorporated, although some are omitted, for example on alternative numerical methods (chapter 7), and others are relegated below later Russian works, for example on nonsymmetric trailing-edge separation in chapter 3. These factors are perfectly understandable and acceptable, however, and form a minor quibble at most. Also, by way of comparison with other recent contributions, analogous criticisms could probably be levelled at the chapters on high Reynolds number asymptotic theories by Rothmayer & Smith in the Handbook of Fluid Dynamics, published in 1998 by CRC Press. Second, are too many or too few details presented (the theory is relatively difficult and subtle, after all)? The reviewer feels that the authors have achieved about the right balance and is happy to congratulate them on it. Third, is the material up to date? Again the answer seems to be mostly yes, at least up to approximately two or three years ago perhaps. That is a reasonable gap, although some parts of the theory are still in quite rapid development currently. Fourth, are codes presented for the interested reader, in what is, in its most interesting range, a fully nonlinear subject which requires careful computation? No, but once more that is understandable, or at least debatable. Most researchers in the area have developed (and promote) their own reliable numerical methods and codes and are unlikely to adopt others without a clear benefit. Nevertheless this might be re-addressed in a re-issue. The Handbook chapters mentioned above also do not present sample codes. Fifth, is the subject matter exclusively on aerodynamics? Yes, there is nothing on internal flows in pipes or channels for example and other contexts where separation is significant. Neither is theory covered on three-dimensional flows, on compressibility effects or on turbulent motions. This may smack of a severe restriction, at first, but in practice it makes for a very wholesome and satisfying presentation of the central theory and its solution properties.

Finally, is there likely to be a large readership for the book? This reviewer hopes so, and recommends the book highly to both newcomers and those experienced in the field.

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