J. Fluid Mech. (2007), *vol.* 581, *pp.* 507.
Printed in the United Kingdom

BOOK REVIEW

Interfacial Convection in Multilayer Systems. By A. Nepomnyashchy, I. Simanovskii & J. C. Legros. Springer, 2006. 306 pp. ISBN 978 0 387 22194 6. €80.20.

J. Fluid Mech. (2007), *vol.* 581, doi:10.1017/S0022112007005666

Flows driven by surface tension gradients (interfacial convection) arise in many different applications, including crystal growth, microfluidics and biological fluid mechanics. In this book, the authors present a compendium of results on thermocapillary flows and on flows with both buoyancy and thermocapillarity. In the first four chapters, rather than focusing on applications, the authors systematically review results on the stability of parallel, multilayer systems with interfacial convection, and discuss the nonlinear flows that appear when the simple equilibrium state is unstable. By focusing on a simple geometry, the authors are able to emphasize the effect of the interactions between the various different physical instability mechanisms that are active in these systems, and also to present examples of the many different flow patterns that can arise as a result. There is a nice balance between detailed mathematical exposition and physical explanation of the various instability mechanisms, and illustrative experimental data are presented where possible. This part of the book is an excellent work of reference on Rayleigh–Bénard and Marangoni convection in two- and three-layer systems, both with and without significant interfacial deformations.

Chapter five discusses results on the stability of two- and three-layer systems whose equilibrium state is a flow along each layer driven by surface tension gradients that exist as a results of a constant applied temperature gradient. Again, the balance between mathematical detail and physical explanation is a nice feature of the text. In summary, chapters one to five constitute an excellent introduction to and reference work on the stability and nonlinear behaviour of multilayer systems with surface tension under the action of lateral and transverse temperature gradients. These chapters constitute 253 of the 272 main pages of text. Chapter six, on thin film flows, and chapter seven, which attempts to cover a variety of related systems, are much shorter and less satisfactory than the earlier chapters, and read rather like the introduction to a PhD thesis, with the authors listing papers and describing briefly what is studied in each. There is no real attempt at mathematical depth.

In summary, the bulk of this book is excellent and, although it is clear that English is not the authors' first language, this does not significantly obscure the content. If the authors could expand the content of chapters six and seven to give the same level of coverage as the first five chapters, this would be an even more valuable resource for mathematicians, physicists and engineers working on the stability of thermocapillary flows.

John Billingham