

REVIEWS

Non-Newtonian Flow and Heat Transfer. By A. H. P. SKELLAND. Wiley, 1967. 469 pp. £7.

The preface to this book announces that it 'is concerned with presenting quantitative relationships useful in application and in terms of measurable properties of the fluid in question', as opposed to 'the approach of the rheologists, who are concerned with describing the fluid behaviour in terms of some mathematical model, but who have rarely attempted to obtain relations of real value to the engineer'.

Predictably, much of the book is concerned with simple shear (laminar) flows. Thus the rheological description of the fluids treated is largely restricted to the shear-stress/shear-rate relationships (flow curves) familiar to the practising rheologist engineer. Although mention is made of viscoelastic fluids, their treatment is by modern standards perfunctory. The second half contains chapters on turbulent flow, optimization, momentum boundary layer theory, mixing and agitation, and heat transfer.

In assessing the merits of this book, one is disarmed to some extent by the author's views quoted above. One cannot apparently argue that the earnest student will learn little of fundamental, as opposed to directly applicable, significance about the non-Newtonian fluids that are important in the rubber, plastics, petroleum, soap, cosmetics and other industries, because he has, by design, eliminated any information that is not directly useful to an engineer.

But how useful in engineering practice are the carefully collated, neatly cross-referenced, and repetitively rehearsed, results chosen by the author? How many real engineering problems do they solve, to justify their exclusive selection? Fewer, I suspect, than the author would admit. The real difficulties of industrial problems are not discussed. Those aspects of real flows—like inhomogeneity, unsteadiness, departures from symmetry—that lead to major setbacks in process development are not mentioned. Why not? Perhaps because they are not immediately amenable to an elementary exposition found suitable for seniors and graduate students.

It would be unfair to blame the author for these weaknesses in an essentially scholarly and well-organized text. Engineering education is now such a large activity that it is self-sustaining. It can deliberately avoid not only the rigorous demands of an enquiring scientific approach, but also the complex and untidy difficulties of modern technology. It achieves complication and elaboration, but not always understanding, freshness, originality, or even relevance. These limitations make the book backward looking and cramped in its concepts. It offers little stimulus and few fresh points of view. It generates no excitement. But it will probably sell well.

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