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BOOK REVIEWS

Theoretical and Applied Rheology, Vols 1 & 2, edited by P. MOLDENAERS & R. KEUNINGS. Elsevier, New York (1992). ISBN 0-444-89007-6. US$340.

Once every 4 years the *International Congress of Rheology* holds a major meeting, where many of the world's rheologists gather to hear the latest developments in the field of deformation and flow. *Theoretical and Applied Rheology*, Vols 1 & 2 represent the published proceedings of the 1992 meeting and this work does deserve the serious attention of any one active in the field. Firstly it should be said that these proceedings are a benchmark that other conference proceedings should aim to reach. The presentation is excellent and the many papers can be easily referenced. The papers, in general, have a common style which makes the substantial content look quite uniform.

The content of the papers covers a wide range of topics and many are quite specialized; however, a series of plenary and keynote papers set the scene for much of the more detailed work. In addition these papers also give a useful perspective on the current state of rheology in the 1990s. For example, the last decade has seen major advances in numerical techniques being applied to complex rheological constitutive equations for both rheometric and more complex engineering flows. The plenary paper by Roger Tanner summarizes the current situation and illustrates how the field is presently divided into differential and integral forms of constitutive equations. There are a number of papers within the proceedings that show that real advances in modelling, e.g. the melt flow behaviour into entry flows, have been made. Solving these high Weissenburg number flows has been brought about by improved numerical techniques, the inclusion of stress or strain softening terms and the introduction of a spectrum of relaxation times.

No sooner has one problem been apparently solved than others appear over the horizon and papers from the MIT team show clearly that time dependence in many viscoelastic flows is of major importance. Beris and Avgousti have already made impressive attempts to numerically model this class of problem and this is an area that will receive considerable attention in the future.

Liquid crystal polymers (LCP) have been a happy hunting ground for rheologists in the last decade and papers by Marruci and Doi illustrate just how difficult it is to introduce both anisotropy and structure into a robust constitutive equation. There is also a series of excellent experimental papers on LCP rheology and structure. These, in particular, seem to illustrate the currently fashionable idea that there is often more to life than rheology alone and, in particular, the combination of rheo-optics can be very powerful.

Extensional flows have received close attention for a number of years and researchers working in this field would do well to look at the paper by Ken Walters, where he shows a range of extensional viscosities for a single fluid that span decades in magnitude depending on the type of test used. This graph will hopefully bring home to people that extensional viscosity measurements are carried out under transient conditions and rarely, if at all, is it possible to access the true time-independent extensional viscosity of a viscoelastic fluid.

In summary, I would expect any Chemical Engineering Department or a department with a significant rheological interest to have a copy of these books in their library, they are well worth having.

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