

"Understanding Rheology" is an interesting, well written book. The title, however, might appear difficult to understand. What does "understanding" mean?

Well, the book is based on a course in introductory rheology for undergraduate and first-year graduate students in chemical and mechanical engineering. Thus the book's aim is to explain what "rheology" means in terms of fluid mechanics, material functions, types of flow, rheometry etc. The aim is not to correlate rheological properties of a material with its microscopic and chemical structure. The experimental data that are discussed in the book do provide a basic knowledge on the special behavior of polymers, but the reader will not understand, how chemical and morphological properties of a material can be designed in order to control the rheological behavior.

Having in mind what "understanding" is meant to be, the reader will benefit from reading the book. The first two chapters give some introductory examples of flow behavior as well as basic mathematics of vectors and tensors. Chapter 3 deals with Newtonian fluid mechanics: starting with conservation of mass and momentum, the Navier-Stokes is introduced and flow problems of incompressible Newtonian fluids are discussed.

Chapters 4 and 5 discuss standard flows for rheology, i.e. simple shear and elongational flow, and explain the material functions that are obtained. It follows a chapter with experimental data from polymers illustrating the material functions that were introduced before. Time-temperature superposition and the influence of molar mass, branching, as well as copolymers and polymer blends are discussed. Steady and unsteady elongational flow properties of polymers are shown as well.

The next three chapters are devoted to constitutive equations, the first of which has power-law generalized Newtonian fluids as main topic. Afterwards memory effects are introduced and the generalized linear viscoelastic model is presented. Chapter 9 is entitled "Introduction to More Advanced Constitutive Modeling". Finger and Cauchy strain tensors are derived and the Lodge equation is discussed. The chapter closes with a few pages on molecular approaches to polymeric constitutive models and reptation theory as well as the CONNFFESSIT approach are mentioned.

The last chapter addresses rheometry. Different experimental techniques as e.g. capillary flow, cone and plate shear flow, uniaxial and biaxial extension etc. are described. Finally flow birefringence as an optical measure of stress is introduced. The book closes with a detailed Appendix which includes a glossary.

To conclude, "Understanding Rheology" is a well written book that can be recommended to students in engineering but also to scientist from other fields who want to enter the field of rheology.

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Bibliography:
Understanding Rheology
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Oxford University Press
Oxford/U.K., 2001
545 pages
ISBN 0-19-514166-0

