

PREFACE

A number of books, devoted to different aspects of both theoretical and applied rheology, were published in the last 20 years. The keyword in the last sentence is “different aspects”. Rheology has a unique structure with its own language, fundamental principles, original concepts, rigorous experimental methods, and a set of well-documented observations with inherent interrelations between various branches of natural science and numerous practical applications.

By examining the enormous volume of rheological literature and meeting various people interested in rheology (university teachers, students, applied scientist, and engineers), the authors felt the need for a systematic presentation of the subject matter in one book – a book that includes all components of rheology and presents them as an independent branch of natural science.

However, it became obvious from the early planning stages that some information would need to be omitted to provide a clear presentation of the concepts, methods, and applications which constitute the essence of efforts that created this science. The wish to present all aspects of rheology will inevitably lead to a book of enormous size. Every attempt to write a scientific book is personal and objective; objective because science benefits from objective assessments and personal because our experiences make us feel that certain aspects are more important than others. In our case, we are university teachers and researchers primarily in the field of applied rheology. An attentive reader will most likely find some reflections of our personal preferences.

Considering the goals and the tasks of the book, the authors tried to limit the choice of references to the first publications on a particular subject, also including reviews and papers providing the most expressive examples and illustrations of the topics under discussion. Accordingly, a great number of original publications are not mentioned. It is regrettable because any serious publication is worth mentioning.

The authors hope that the readers of the book will benefit from our presentation of rheology as an interrelated system of concepts, principal phenomena, experimental methods, and directions of their application. Our rheology is also a science interwoven with other branches of theoretical and applied sciences. We take many opportunities to emphasize these links because they enrich science, make it easier to understand and apply, and this also helps to fulfil our goals concisely expressed in the book title. To amplify its usefulness as a teaching tool, all chapters of the book contain questions to be used by readers to assess their knowledge of particular subject. Answers to these questions are included as the last part of the book.

Finally, the authors are glad to fulfil their pleasing duty to thank Dr. Andrei Andrianov (Moscow State University) for his technical assistance in preparing the computer

versions of many figures and realizing the liaison between the authors. The authors are also grateful to Dr. Sayata Ghose for painstaking proofreading and making corrections for this book.

Special gratitude goes to Professor J.L. White who read the manuscript of the book and made many valuable comments, which helped to enrich the presented text.

We express our deep gratitude to publishers of various journals (Advances in Polymer Science, Colloid Journal, European Polymer Journal, International Journal of Polymeric Materials, Journal of Applied Polymer Science, Journal of Macromolecular Science, Journal of Non-Newtonian Fluid Mechanics, Journal of Polymer Science, Journal of Rheology, Macromolecular Chemie, Polymer, Polymer Engineering and Science, Polymer Science USSR, Reviews of Scientific Instruments, Rheologica Acta) and books (Rheology of Elastomers by P. Mason and N. Wookey (eds), A Practical Approach to Rheology and Rheometry by G. Schramm for permission to use figures from their publications.

Alexander Ya. Malkin,
Moscow, Russia
Avraam I. Isayev
Akron, Ohio, USA
July, 2005