

This Week's Citation Classic®

Bird R B, Armstrong R C & Hassager O. *Dynamics of polymeric liquids. Volume 1. Fluid mechanics.* New York: Wiley, 1977. 576 p.; and **Bird R B, Hassager O, Armstrong R C & Curtiss C F.** *Dynamics of polymeric liquids. Volume 2. Kinetic theory.* New York: Wiley, 1977. 288 p.

[Chemical Engineering Dept., Rheology Res. Ctr., and Theoretical Chemistry Inst., Univ. Wisconsin, Madison, WI; Chemical Engineering Dept., Massachusetts Inst. Technology, Cambridge, MA; and Inst. Kemiteknik, Danmarks Tekniske Højskole, Lyngby, Denmark]

This two-volume treatise provides the continuum mechanical and statistical mechanical description of polymer solutions and polymer melts, with emphasis on explaining rheological behavior and solving problems of fluid dynamics. Many examples illustrating problem-solving techniques are included, and comparisons between theory and experiment are given whenever possible. [The *SCI*® indicates that these books have been cited in over 450 and 315 publications, respectively.]

R. Byron Bird

Department of Chemical Engineering
University of Wisconsin
Madison, WI 53706

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In the spring of 1973, a few weeks before they were to receive their PhDs, Bob Armstrong and Ole Hassager came to my office and said they'd like to write a book with me based on some course notes I had prepared on polymer fluid dynamics and kinetic theory. During the summer of 1973 we developed the outline for the book and wrote several chapters. In September Bob left to join the faculty at the Massachusetts Institute of Technology (MIT), and Ole stayed on as a postdoc until December 1974, by which time the manuscript was finished, and Ole returned to Denmark for a tour of naval duty.

After six months Wiley sent us the reviewers' comments and the recommendation that the book be split into two volumes: elementary/advanced. We decided that a continuum/molecular split was preferable. We also decided that Chuck Curtiss should be a coauthor on volume 2 because of his many contributions to our thinking about the molecular aspects of poly-

mer rheology and because Chuck and I had been team-teaching a course on polymer kinetic theory since about 1971. His article,¹ coauthored with two of us, became the basis of chapter 14; Chuck also helped rewrite the other chapters of volume 2. In 1976 the revised manuscript was finished and the two volumes appeared in early 1977.

The manuscript for the book was used in classes at the University of Wisconsin and MIT, and the students' comments were invaluable; many errors were corrected and obscure passages revised. This class-testing contributed considerably to the success the book has enjoyed. We also feel that the readers appreciated the uniformity of notation throughout the two volumes as well as the care we took in preparing tabular material, illustrative examples, literature citations, and cross-referencing between the two volumes. The emphasis on the connection between the continuum and molecular viewpoints was a unique feature of the book.

By 1984 it became apparent that a new edition of the book was needed because of the many advances in the field. In volume 1 we shifted the emphasis from rheology to fluid dynamics and from the corotational formalism to the codeformational (or convected) formalism. In volume 2 we added new material on polymer melts and on translational diffusion. The two volumes^{2,3} were completely rewritten and updated, and the second edition appeared in 1987. The authorship of volume 2 was changed to reflect Chuck's greater role and because of his leadership in the development of a kinetic theory for polymer melts.^{4,5}

In the second edition we acknowledged our indebtedness to the writings of J.G. Oldroyd and J.G. Kirkwood in "secret messages" on pages ix and xi in each volume (read the first letters of each sentence). Another similarly encoded message is on pages v-viii. The first edition also contained encoded messages.

1. Curtiss C F, Bird R B & Hassager O. Kinetic theory and rheology of macromolecular solutions. *Advan. Chem. Phys.* 35:31-117, 1976. (Cited 60 times.)
2. Bird R B, Armstrong R C & Hassager O. *Dynamics of polymeric liquids. Volume 1. Fluid mechanics.* New York: Wiley-Interscience, 1987. 649 p.
3. Bird R B, Curtiss C F, Armstrong R C & Hassager O. *Dynamics of polymeric liquids. Volume 2. Kinetic theory.* New York: Wiley-Interscience, 1987. 437 p.
4. Curtiss C F & Bird R B. A kinetic theory for polymer melts. I. The equation for the single-link orientational distribution function. *J. Chem. Phys.* 74:2016-25, 1981. (Cited 100 times.)
5. ———. A kinetic theory for polymer melts. II. The stress tensor and the rheological equation of state. *J. Chem. Phys.* 74:2026-33, 1981. (Cited 90 times.)

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