### Modelling Polydisperse Polymer Melts with Single Integral Constitutive Equations - David Wayne Mead - 1988

Constitutive Equations for Polymer Melts and Solutions - Ronald G. Larson - 2013-10-22

Constitutive Equations for Polymer Melts and Solutions presents a description of important constitutive equations for stress and birefringence in polymer melts, as well as in dilute and concentrated solutions of flexible and rigid polymers, and in liquid crystalline materials. The book serves as an introduction and guide to constitutive equations, and to molecular and phenomenological theories of polymer motion and flow. The chapters in the text discuss topics on the flow phenomena commonly associated with viscoelasticity: fundamental elementary models for understanding the rheology of melts, solutions of flexible polymers, and advanced constitutive equations; melts and concentrated solutions of flexible polymer; and the rheological properties of real liquid crystal polymers. Chemical engineers and physicists will find the text very useful.

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### Evaluation of constitutive equations for polymer melts and solutions in complex flows - Hans Baaijens - 1994


New Constitutive Equations for Orientable Polymer Melts - Celine Almonacil - 1996

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### Rheology for Polymer Melt Processing - J.-M. Piau - 1996-10-10

**Rheology for Polymer Melt Processing**

This book presents the main results obtained by different laboratories involved in the research group Rheology for polymer melt processing which is associated with French universities, schools of engineering, and the CNRS (Centre National de la Recherche Scientifique - France). The group comprises some 15 research laboratories of varied disciplines (chemistry, physics, material sciences, mechanics, mathematics), but with a common challenge viz. to enhance the understanding of the relationships between macromolecular species, their rheology and their processing. Some crucial issues of polymer science have been addressed: correlation of viscoelastic macroscopic bulk property measurements and models, slip at the wall, extrusion defects, correlation between numerical flow simulations and experiments. Features of the book: • The book is unique in that it allows one to grasp the key issues in polymer rheology and processing at once through a series of detailed state-of-the-art contributions, which were previously scattered throughout the literature. • Each paper was reviewed by experts and the book editors and some coordination was established in order to achieve a readable and easy access style. • Papers have been grouped in sections covering successively: Molecular dynamics, Constitutive equations and numerical modelling, Simple and complex flows. • Each paper can be read independently. Since the book is intended as an introduction to the main topics in polymer processing, it will be of interest to graduate students as well as to scientists in academic and industrial laboratories.

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Constitutive Equations for Linear and Long-chain-branched Polymer Melts - Saeid Kheirandish - 2005
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Polymer Melt Processing - Morton M. Denn - 2008-08-04
Most of the shaping in the manufacture of polymeric objects is carried out in the melt state, as it is a substantial part of the physical property development. Melt processing involves an interplay between fluid mechanics and heat transfer in rheologically complex liquids, and taken as a whole it is a nice example of the importance of coupled transport processes. This book is on the underlying foundations of polymer melt processing, which can be derived from relatively straightforward ideas in fluid mechanics and heat transfer; the level is that of an advanced undergraduate or beginning graduate course, and the material can serve as the text for a course in polymer processing or for a second course in transport processes.

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Nonlinear Phenomena in Flows of Viscoelastic Polymer Fluids - A.I. Leonov - 2012-12-06
This monograph presents theoretical and experimental studies of flows of elastic liquids. Falling into this category are particularly the melts and concentrated solutions of such flexible-chain polymers as polyethylene, polystyrene, and polypropylene, all of which are widely used in polymer processing. These polydisperse polymers vary greatly, from batch to batch, in their mechanical properties and 20% variation in a property is believed to be good enough. I 7 All recent books - devoted to the rheology of polymers do not answer the question of which constitutive equations should be used for solving the fluid mechanic problems of polymer processing in the usual case of an appreciable nonlinear region of deformation where nonlinear effects of shear and extensional elasticity are very important. Viscoelastic constitutive equations cited commonly (see, e.g. Refs 5 and 6) do not describe simultaneously even the simplest cases of deformations, viz. simple shear and uniaxial extension. Moreover, some of them are internally inconsistent ent and sometimes display highly unstable behaviour in simple flows without any fundamental reasons. Even more respected molecular ap free from these defects.

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Polymer Processing Instabilities - Savvas C. Hatizikiaios - 2004-11-30
Polymer Processing Instabilities: Control and Understanding offers a practical understanding of the various flows that occur during the processing of polymer melts. The book pays particular attention to flow instabilities that affect the rate of production and the methods used to prevent and eliminate flow instabilities in order to increase production rates and enhance manufacturing efficiency. Polymer Processing Instabilities: Control and Understanding summarizes experimental observations of flow instabilities that occur in numerous processing operations such as extrusion, injection molding, fiber spinning, film casting, and film blowing for a wide range of materials, including most commodity polymers that are processed as melts at temperatures above their melting point or as concentrated solutions at lower temperatures. The book first presents the fundamental principles in rheology and flow instabilities. It relates the operating conditions with flow curves, the critical wall shear stress for the onset of the instabilities, and new visualization techniques with numerical modeling and molecular structure. It reviews one-dimensional phenomenological relaxation/oscillation models describing the experimental process. It confines the gross melt fracture (GMF) instability, and examines how traditional and non-traditional processing aids eliminate melt fracture and improve polymer processability. It supplies a numerical approach for the investigation of the linear viscoelastic stability behavior of simplified injection molding flows and examines a newly discovered family of instabilities that occur in co-extrusion. Polymer Processing Instabilities: Control and Understanding is unique in that it fills a gap in the polymer processing literature where polymer flow instabilities are not treated in-depth in any book. It summarizes state-of-the-art...
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Predictions of Double-step Stress Relaxations Using a Novel Constitutive Equation for Polymer Melts
and Concentrated Solutions - Shin-ichi Kihara - 1996

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Springer Handbook of Experimental Fluid Mechanics - Cameron Tropea - 2007-10-09
Accompanying DVD-ROM contains "all chapters of the Springer Handbook."-Page 3 of cover.

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Fundamentals of Polymer Engineering, Third Edition - Anil Kumar - 2018-12-07
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chain-growth polymerization, polymer characterization, thermodynamics and structural, mechanical, thermal and
transport behavior of polymers as melts, solutions and solids, Fundamentals of Polymer Engineering, Third
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It contains modern theories and real-world examples for a clear understanding of polymer function and
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Simulation of Material Processing: Theory, Methods and Application - Ken-ichiro Mori - 2001-01-01
This volume contains about 180 papers including seven keynote presentations at the 7th NUMIFORM Conference. It
reflects the state-of-the-art of simulation of industrial forming processes such as rolling, forging, sheet metal
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Polymer Melt Fracture - Rudy Koopmans - 2010-08-03
The continually growing plastics market consists of more than 250 million tons of product annually, making the
recurring problem of polymer melt fracture an acute issue in the extrusion of these materials. Presenting a
picture book of the different types of melt fracture and real industrial extrusion defect remediation strategies
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Stability of Non-Linear Constitutive Formulations for Viscoelastic Fluids
- Dennis A. Siginer - 2013-12-05
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of the field of constitutive equations for flowing viscoelastic fluids, in particular on their non-linear behavior, the
equations on the dynamics of viscoelastic fluid flow in tubes. This book gives an overall view of the theories and
attendant methodologies developed independently of thermodynamic considerations as well as those set within a
thermodynamic framework to derive non-linear rheological constitutive equations for viscoelastic fluids.
Developments in formulating Maxwell-like constitutive differential equations as well as single integral constitutive
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**Viscoelasticity of Polymers** - Kwang Soo Cho - 2016-05-30

This book offers a comprehensive introduction to polymer rheology with a focus on the viscoelastic characterization of polymeric materials. It contains various numerical algorithms for the processing of viscoelastic data, from basic principles to advanced examples which are hard to find in the existing literature. The book takes a multidisciplinary approach to the study of the viscoelasticity of polymers, and is self-contained, including the essential mathematics, continuum mechanics, polymer science and statistical mechanics needed to understand the theories of polymer viscoelasticity. It covers recent achievements in polymer rheology, such as theoretical and experimental aspects of large amplitude oscillatory shear (LAOS), and numerical methods for linear viscoelasticity, as well as new insights into the interpretation of experimental data. Although the book is balanced between the theoretical and experimental aspects of polymer rheology, the author’s particular interest in the theoretical side will not remain hidden. Aimed at readers familiar with the mathematics and physics of engineering at an undergraduate level, the multidisciplinary approach employed enables researchers with various scientific backgrounds to expand their knowledge of polymer rheology in a systematic way.

**Fundamentals of Polymer Engineering, Revised and Expanded** - Anil Kumar - 2003-01-21

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**Adhesive Bonding** - L.H. Lee - 2013-06-29

For several years, I have been responsible for organizing and teaching in the fall a short course on “Fundamentals of Adhesion: Theory, Practice, and Applications” at the State University of New York at New Paltz. Every spring I would try to assemble the most pertinent subjects and line up several capable lecturers for the course. However, there has always been one thing missing—an authoritative book that covers most aspects of adhesion and adhesive bonding. Such a book would be used by the participants as a main reference throughout the course and kept as a sourcebook after the course had been completed. On the other hand, this book could not be one of those “All you want to know about” volumes, simply because adhesion is an interdisciplinary and ever-growing field. For the same reason, it would be very difficult for a single individual, especially me, to undertake the task of writing such a book. Thus, I rely on the principle that one leaves the truly monumental jobs to experts, and I finally succeeded in asking several leading scientists in the field of adhesion to write separate chapters for this collection. Some chapters emphasize theoretical concepts and others experimental techniques. In the humble beginning, we planned to include only twelve chapters. However, we soon realized that such a plan would leave too much ground uncovered, and we resolved to increase the coverage. After the book had evolved into thirty chapters, we started to feel that perhaps our mission had been accomplished.

**Polymer Rheology and Processing** - A.A. Collyer - 1990-10-31

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**Polymer Processing** - Donald G. Baird - 2014-03-10

Fundamental concepts coupled with practical, step-by-step guidance. With its emphasis on core principles, this text equips readers with the skills and knowledge to design the many processes needed to safely and successfully manufacture thermoplastic parts. Thetfirst half of the text sets forth the general theory and concepts underlying polymer processing, such as the viscoelastic response of polymeric fluids and diffusion and mass transfer. Next, the text explores specific practical aspects of polymer processing including mixing, extrusion dies, and post-die processing. By bridging a broad range of design issues and methods, the authors demonstrate how to solve most common processing problems. This text is an invaluable reference for anyone involved in polymer processing.
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**Rheology - Volume I** - Crispulo Gallegos - 2010-11-30

Rheology is a component of Encyclopedia of Chemical Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty Encyclopedias. Rheology is the study of the flow of matter. It is classified as a physics discipline and focuses on substances that do not maintain a constant viscosity or state of flow. That can involve liquids, soft solids and solids that are under conditions that cause them to flow. It applies to substances which have a complex molecular structure, such as muds, slurdes, suspensions, polymers and other glass formers, as well as many foods and additives, bodily fluids and other biological materials. The theme on rheology focuses on five main areas, namely: basic concepts of rheology; rheometry; rheological materials; rheological processes and theoretical rheology. Of course, many of the chapters contain material from more than one general area. Rheology is an interdisciplinary subject which embraces many aspects of mathematics, physics, chemistry, engineering and biology. These two volumes are aimed at the following five major target audiences: University and College students Educators, Professional practitioners, Research personnel and Policy analysts, managers, and decision makers and NGOs.

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Rheology is a component of Encyclopedia of Chemical Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty Encyclopedias. Rheology is the study of the flow of matter. It is classified as a physics discipline and focuses on substances that do not maintain a constant viscosity or state of flow. That can involve liquids, soft solids and solids that are under conditions that cause them to flow. It applies to substances which have a complex molecular structure, such as muds, slurdes, suspensions, polymers and other glass formers, as well as many foods and additives, bodily fluids and other biological materials. The theme on rheology focuses on five main areas, namely: basic concepts of rheology; rheometry; rheological materials; rheological processes and theoretical rheology. Of course, many of the chapters contain material from more than one general area. Rheology is an interdisciplinary subject which embraces many aspects of mathematics, physics, chemistry, engineering and biology. These two volumes are aimed at the following five major target audiences: University and College students Educators, Professional practitioners, Research personnel and Policy analysts, managers, and decision makers and NGOs.

**Key Elements in Polymers for Engineers and Chemists** - Alexandr A. Berlin - 2014-05-13

This text addresses the latest developments in the field, covering the major advances that have occurred over the past five years in the polymerization and structure of new generation polystyrenes that are broadening its scope of application. It covers the advent of branched polystyrenes, syndiotactic polystyrene, high-molecular weight general purpose PS, styrenic interpolymers, and clear SBS copolymers. Presents voluminous research previously only reported at conferences in one reference Unique coverage of a topic not found in the field for a graduate course.

**Modern Styrenic Polymers** - John Sheirs - 2003-03-28

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**Melt Rheology and its Applications in the Plastics Industry** - John M Dealy - 2013-05-14

This is the second edition of Melt Rheology and its Role in Plastics Processing, although the title has changed to reflect its broadened scope. Advances in the recent years in rheometer technology and polymer science have greatly enhanced the usefulness of rheology in the plastics industry. It is now possible to design polymers having specific molecular structures and to predict the flow properties of melts having those structures. In addition, rheological properties now provide more precise information about molecular structure. This book provides all the information that is needed for the intelligent application of rheology in the development of new polymers, the determination of molecular structure and the correlation of processability with laboratory test data. Theory and equations are limited to what is essential for the use of rheology in the characterization of polymers, the development of new plastics materials and the prediction of plastics processing behavior. The emphasis is on information that will be of direct use to practitioners. Extensive references are provided for those wishing to pursue certain issues in greater depth. While the primary audience is applied polymer scientists and plastics engineers, the book will also be of use to postgraduate students in polymer science and engineering as a text for a graduate course.

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and extensions of the laws of vector analysis to domains bounded by fractal curves or surfaces. The third and fourth chapters, under the heading Constitutive Modelling, present the tools necessary to formulate constitutive equations from the continuum or the microstructural approach. The last three chapters, under the caption Analytical and Numerical Techniques, contain most of the important results in the domain of the fluid mechanics of viscoelasticty, and form the core of the book. A number of topics of interest have not yet been developed to a theoretical level from which applications can be made in a routine manner. However, the authors have included these topics to make the reader aware of the state of affairs so that research into these matters can be carried out. For example, the sections which deal with domains bounded by fractal curves or surfaces show that the existence of a stress tensor in such regions is still open to question. Similarly, the constitutive modelling of suspensions, especially at high volume concentrations, with the corresponding particle migration from high to low shear regions is still very sketchy.

Trends in Food Engineering - Jorge E. Lozano - 2000-06-07
Trends in Food Engineering presents a wide vision of food engineering, with an emphasis on topics vital to the food industry today. The first section deals with physical and sensory properties of food. The emphasis in these chapters is on structure-function relationships, food rheology, and the correlations between physicochemical and sensory data.

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New Trends in Physics and Physical Chemistry of Polymers - Liang-Huang Lee - 2012-12-06
Between June 6-10, 1988, the Third Chemical Congress of North America was held at the Toronto Convention Center. At this rare gathering, fifteen thousand scientists attended various symposia. In one of the symposia, Professor Pierre-Gilles de Gennes of College de France was honored as the 1988 recipient of the Amer ican Chemical Society Polymer Chemistry Award, sponsored by Mobil Chemical Corporation. For Professor de Gennes, this international setting could not be more fitting. For years, he has been a friend and a lecturer to the world of scientific community. Thus, for this special occasion, his friends came to recount many of his achievements or report new research findings mostly derived from his theories or stimulated by his thoughts. In this volume of Proceedings, titled New Trends in Physics and Physical Chemistry of Polymers, we are glad to present the revised papers for the Symposium and some contributed after the Symposium. In addition, we intend to include most of the lively discussions that took place during the conference. This volume contains a total of thirty-six papers divided into six parts, primarily according to the nature of the subject matter: • Adsorption of Colloids and
Diffusion and Interdiffusion of Polymers. • Entanglement and Reptation of Polymer Melts and Networks. • Phase Transitions and Gel Electrophoresis.

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**Mechanics of Polymer Processing** - J.R. Pearson - 1985-01-31

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