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Dynamics of Polymeric Liquids, Volume 1

Fluid Mechanics

Wiley-Interscience Dynamics of Polymeric Liquids, Second Edition Volume 2: Kinetic Theory R. Byron Bird, Charles F. Curtiss, Robert C. Armstrong and Ole Hassager Volume Two deals with the molecular aspects of polymer rheology and fluid dynamics. It is the only book currently available dealing with kinetic theory and its relation to nonlinear rheological properties. Considerable emphasis is given to the connection between kinetic theory results and experimental data. The second edition contains new material on the basis for molecular modeling, the application of phase-space theory to dilute solutions, kinetic theory of melts and melt mixtures, and network theories. 1987 (0 471-80244-1) 450 pp.

Dynamics of Polymeric Liquids, Kinetic Theory

Wiley-Interscience

Dynamics of Polymeric Liquids, Volume 2

Kinetic Theory

Wiley-Interscience This two-volume work is detailed enough to serve as a text and comprehensive enough to stand as a reference. Volume 1, Fluid Mechanics, summarizes the key experiments that show how polymeric fluids differ from structurally simple fluids, then presents, in rough historical order, various methods for solving polymer fluid dynamics problems. Volume 2, Kinetic Theory, uses molecular models and the methods of statistical mechanics to obtain relations between bulk flow behavior and polymer structure. Includes end-of-chapter problems and extensive appendixes.

Dynamics of Polymeric Liquids: Bird, R. B., Armstrong, R. C., Hassager, O. Fluid mechanics

John Wiley & Sons

Dynamics of Polymeric Liquids, 2 Volume Set

Wiley-Interscience This two-volume work is detailed enough to serve as a text and comprehensive enough to stand as a reference. Volume 1, Fluid Mechanics, summarizes the key experiments that show how polymeric fluids differ from structurally simple fluids, then presents, in rough historical order, various methods for solving polymer fluid dynamics problems. Volume 2, Kinetic Theory, uses molecular models and the methods of statistical mechanics to obtain relations between bulk flow behavior and polymer structure. Includes end-of-chapter problems and extensive

appendixes.

Momentum, Heat, and Mass Transfer Fundamentals

CRC Press "Presents the fundamentals of momentum, heat, and mass transfer from both a microscopic and a macroscopic perspective. Features a large number of idealized and real-world examples that we worked out in detail."

Dynamics of Polymeric Liquids, Volume 2

Kinetic Theory

Wiley-Interscience This two-volume work is detailed enough to serve as a text and comprehensive enough to stand as a reference. Volume 1, Fluid Mechanics, summarizes the key experiments that show how polymeric fluids differ from structurally simple fluids, then presents, in rough historical order, various methods for solving polymer fluid dynamics problems. Volume 2, Kinetic Theory, uses molecular models and the methods of statistical mechanics to obtain relations between bulk flow behavior and polymer structure. Includes end-of-chapter problems and extensive appendixes.

Stochastic Processes in Polymeric Fluids

Tools and Examples for Developing Simulation Algorithms

Springer Science & Business Media This book consists of two strongly interweaved parts: the mathematical theory of stochastic processes and its applications to molecular theories of polymeric fluids. The comprehensive mathematical background provided in the first section will be equally useful in many other branches of engineering and the natural sciences. The second part provides readers with a more direct understanding of polymer dynamics, allowing them to

identify exactly solvable models more easily, and to develop efficient computer simulation algorithms in a straightforward manner. In view of the examples and applications to problems taken from the front line of science, this volume may be used both as a basic textbook or as a reference book. Program examples written in FORTRAN are available via ftp from ftp.springer.de/pub/chemistry/polysim/.

Materials Science and Engineering. Volume I

Physical Process, Methods, and Models

CRC Press This volume highlights the latest developments and trends in advanced non-classical materials and structures. It presents the developments of advanced materials and respective tools to characterize and predict the material properties and behavior. It also includes original, theoretical, and important experimental results that use non-routine methodologies often unfamiliar to the usual readers. The chapters on novel applications of more familiar experimental techniques and analyses of composite problems underline the need for new experimental approaches.

Handbook of Fluid Dynamics

CRC Press This book provides professionals in the field of fluid dynamics with a comprehensive guide and resource. The book balances three traditional areas of fluid mechanics - theoretical, computational, and experimental - and expounds on basic science and engineering techniques. Each chapter introduces a topic, discusses the primary issues related to this subject, outlines approaches taken by experts, and supplies references for further information. Topics discussed include: basic engineering fluid dynamics classical fluid dynamics turbulence modeling reacting flows multiphase flows flow and porous media high Reynolds number asymptotic theories finite difference method finite volume method finite element method spectral element methods for incompressible flows experimental methods, such as hot-wire anemometry, laser-Doppler velocimetry, and flow visualization applications, such as axial-flow compressor and fan aerodynamics, turbomachinery, airfoils and wings, atmospheric flows, and mesoscale oceanic flows The text enables experts in particular areas to become familiar with useful information from outside their specialization, providing a broad reference for the significant areas within fluid dynamics.

Polymer Processing

Principles and Design

John Wiley & Sons 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. The first 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 addressing a broad range of design issues and methods, the authors demonstrate how to solve most common processing problems. This Second Edition of the highly acclaimed Polymer Processing has been thoroughly updated to reflect current polymer processing issues and practices. New areas of coverage include: Micro-injection molding to produce objects weighing a fraction of a gram, such as miniature gears and biomedical devices New chapter dedicated to the recycling of thermoplastics and the processing of renewable polymers Life-cycle assessment, a systematic method for determining whether recycling is appropriate and which form of recycling is optimal Rheology of polymers containing fibers Chapters feature problem sets, enabling readers to assess and reinforce their knowledge as they progress through the text. There are also special design problems throughout the text that reflect real-world polymer processing issues. A companion website features numerical subroutines as well as guidance for using MATLAB®, IMSL®, and Excel to solve the sample problems from the text. By providing both underlying theory and practical step-by-step guidance, Polymer Processing is recommended for students in chemical, mechanical, materials, and polymer engineering.

Flows in Polymers, Reinforced Polymers and Composites

A Multi-Scale Approach

Springer This book gives a detailed and practical introduction to complex flows of polymers and reinforced polymers as well as the flow of simple fluids in complex microstructures. Over the last decades, an increasing number of functional and structural parts, made so far with metals, has been progressively reengineered by replacing metallic materials by polymers, reinforced polymers and composites. The motivation for this substitution may be the weight reduction, the simpler, cheaper or faster forming process, or the ability to exploit additional functionalities. The present Brief surveys modern developments related to the multi-scale modeling and simulation of polymers, reinforced polymers, that involve a flowing microstructure and continuous fiber-reinforced composites, wherein the fluid flows inside a nearly stationary multi-scale microstructure. These developments concern both multi-scale modeling, defining bridges between the micro and macro scales - with special emphasis on the mesoscopic scale at which kinetic theory descriptions apply and advanced simulation techniques able to address efficiently the ever more complex and detailed models defined at different scales. This book is addressed to students (Master and doctoral levels), researchers and professionals interested in computational rheology and material forming processes involving polymers, reinforced polymers and composites. It provides a unique coverage of the state of the art in these multi-disciplinary fields.

Complex Fluid-Flows in Microfluidics

Springer This monograph contains expert knowledge on complex fluid-flows in microfluidic devices. The topical spectrum includes, but is not limited to, aspects such as the analysis, experimental characterization, numerical simulations and numerical optimization. The target audience primarily comprises researchers who intend to embark on activities in microfluidics. The book can also be beneficial as supplementary reading in graduate courses.

Mechanical and Thermophysical Properties of Polymer

Liquid Crystals

Springer Science & Business Media may never overcome the effects of hysteresis and stress (see Chapters 6 and 12). The first sentence of the reference work, Handbook of Liquid Crystals, reads: The terms liquid crystals, crystalline liquid, mesophase, and mesomorphous state are used synonymously to describe a state of aggregation that exhibits a molecular order in a size range similar to that of a crystal but acts more or less as a viscous liquid: [2] In other words, molecules within a liquid crystalline phase possess some orientational order and lack positional order; furthermore, the shape of a liquid crystalline sample is determined by the vessel in which it is contained rather than by the orientational order of its aggregated molecules. The authors recognized the limitations and imprecision of this definition but, like others preceding them, could not devise a simple and generally applicable one that is better. Regardless, the terms 'liquid crystal' and 'mesophase' should not be used interchangeably. As mentioned above, all liquid crystals are mesophases, but all mesophases are not liquid crystals. Recent studies, employing elaborate and sophisticated analytical techniques, have permitted finer distinctions between classical crystals and mesophases. At the same time, they have made definitions like that from the Handbook of Liquid Crystals somewhat obsolete for reasons other than terminology. One part of the problem arises from the use of a combination of bulk properties (like flow) and microscopic properties (like molecular ordering) within the same definition.

Polymeric Liquids & Networks

Structure and Properties

Garland Science Polymeric Liquids and Networks: Structure and Properties is the first book of two by William W. Graessley that presents a unified view of flexible-chain polymer liquids and networks. The topics of both volumes range from equilibrium properties to dynamic response, finite deformation behavior and non-Newtonian flow. The second book will be titled Polymeric Liquids and Networks: Dynamics and Rheology. These various aspects of the field were developed over the past 70 years by researchers from many academic disciplines. The infusion of fresh viewpoints continually invigorated and enriched the field, making polymeric liquids and networks a truly

interdisciplinary subject. The lack of a common terminology and perspective, however, has led to compartmentalization, making it difficult for a newcomer, even one technically trained, to gain a broad appreciation of the field and to see the relationships among its various parts. The aim of these two books, without diluting the substance, is to achieve a desired unity.Polymeric Liquids and Networks emphasizes fundamental principles and a molecular viewpoint. The conceptual basis of theories underlying each topical area is explained with derivations sometimes outlined briefly and sometimes given in detail. Technical terminology is kept to a minimum necessary for coherent presentation. The goal of the text is to provide an informed understanding rather than detailed technical proficiency. Theory, experiment, and simulation are woven together as appropriate for achieving a balanced view. The books are designed to serve academic and industrial needs, consolidating the understanding of topics with both practical and fundamental significance, and written from a technical but non-specialized perspective.The books deal mainly with non-polar and weakly polar species and largely with results derived from experiments on structurally well-defined systems. The objective is not to ignore

Handbook of Adhesion Technology

Springer Science & Business Media Adhesives have been used for thousands of years, but until 100 years ago, the vast majority was from natural products such as bones, skins, fish, milk, and plants. Since about 1900, adhesives based on synthetic polymers have been introduced, and today, there are many industrial uses of adhesives and sealants. It is difficult to imagine a product—in the home, in industry, in transportation, or anywhere else for that matter—that does not use adhesives or sealants in some manner. The Handbook of Adhesion Technology is intended to be the definitive reference in the field of adhesion. Essential information is provided for all those concerned with the adhesion phenomenon. Adhesion is a phenomenon of interest in diverse scientific disciplines and of importance in a wide range of technologies. Therefore, this handbook includes the background science (physics, chemistry and materials science), engineering aspects of adhesion and industry specific applications. It is arranged in a user-friendly format with ten main sections: theory of adhesion, surface treatments, adhesive and sealant materials, testing of adhesive properties, joint design, durability, manufacture, quality control, applications and emerging areas. Each section contains about five chapters written by internationally renowned authors who are authorities in their fields. This book is intended to be a reference for people needing a quick, but authoritative, description of topics in the field of adhesion and the practical use of adhesives and sealants. Scientists and engineers of many different backgrounds who need to have an

understanding of various aspects of adhesion technology will find it highly valuable. These will include those working in research or design, as well as others involved with marketing services. Graduate students in materials, processes and manufacturing will also want to consult it.

High Pressure Rheology for Quantitative Elastohydrodynamics

Elsevier Computational elastohydrodynamics, a part of tribology, has existed happily enough for about fifty years without the use of accurate models for the rheology of the liquids used as lubricants. For low molecular weight liquids, such as low viscosity mineral oils, it has been possible to calculate, with precision, the film thickness in a concentrated contact provided that the pressure and temperature are relatively low, even when the pressure variation of viscosity is not accurately modelled in detail. Other successes have been more qualitative in nature, using effective properties which come from the fitting of parameters used in calculations to experimental measurements of the contact behaviour, friction or film thickness. High Pressure Rheology for Quantitative Elastohydrodynamics is intended to provide a sufficiently accurate framework for the rheology of liquids at elevated pressure that it may be possible for computational elastohydrodynamics to discover the relationships between the behaviour of a lubricated concentrated contact and the measurable properties of the liquid lubricant. The required high-pressure measurement techniques are revealed in detail and data are presented for chemically well-defined liquids that may be used as quantitative reference materials. * Presents the property relations required for a quantitative calculation of the tribological behaviour of lubricated concentrated contacts. * Details of high-pressure experimental techniques. * Complete description of the pressure and temperature dependence of viscosity for high pressures. * Some little-known limitations on EHL modelling.

Advances in the Flow and Rheology of Non-Newtonian

Fluids

Elsevier These two volumes contain chapters written by experts in such areas as bio and food rheology, polymer rheology, flow of suspensions, flow in porous media, electrorheological fluids, etc. Computational as well as analytical mathematical descriptions, involving appropriate constitutive equations deal with complex flow situations of industrial importance. This work is unique in that it brings together state of the art reviews and recent advances in a variety of areas, involving viscoelastic materials, in a desirable and timely manner.

Structure and Functional Properties of Colloidal Systems

CRC Press Integrating fundamental research with the technical applications of this rapidly evolving field, Structure and Functional Properties of Colloidal Systems clearly presents the connections between structure and functional aspects in colloid and interface science. It explores the physical fundamentals of colloid science, new developments of synthesis and conditioning, and many possible applications. Theory Divided into three parts, the book begins with a discussion of the theoretical side of colloid dynamics. It then transitions to dynamically arrested states and capillary forces in colloidal systems at fluid interfaces. Structure Covering the structural aspects of different colloidal systems, the second section examines electric double layers and effective interactions as well as the structure of extremely bimodal suspensions and filaments made up of microsized magnetic particles. The contributors analyze the role played by the attractive interaction, confinement, and external fields on the structure of colloidal systems. They also discuss structural aspects in food emulsions and the rheological properties of structured fluids. Functional Materials The last part focuses on examples of functional colloids. These include polymer colloids, protein-functionalized colloidal particles, magnetic particles, metallic nanoparticles, micro- and nanogels, responsive microgels, colloidal photonic crystals, microfluidics, gel-glass dispersed liquid crystals (GDLCs) devices, and nanoemulsions. This volume provides a sound understanding of the link between the structure and functional properties in two- and three-dimensional colloidal systems. It describes techniques to functionalize colloids, characterization methods, the physical fundamentals of structure formation, diffusion dynamics, transport properties in equilibrium, the physical fundamentals of nonequilibrium systems, the measuring principles to exploit properties in applications, the differences in designing lab experiments and devices, and several application examples.

Melt Rheology and Its Role in Plastics Processing

Theory and Applications

Springer Science & Business Media This book is designed to fulfill a dual role. On the one hand it provides a description of the rheological behavior of molten poly mers. On the other, it presents the role of rheology in melt processing operations. The account of rheology emphasises the underlying principles and presents results, but not detailed deriva tions of equations. The processing operations are described qualita tively, and wherever possible the role of rheology is discussed quantitatively. Little emphasis is given to non-rheological aspects of processes, for example, the design of machinery. The audience for which the book is intended is also dual in It includes scientists and engineers whose work in the nature. plastics industry requires some knowledge of aspects of rheology. Examples are the polymer synthetic chemist who is concerned with how a change in molecular weight will affect the melt viscosity and the extrusion engineer who needs to know the effects of a change in molecular weight distribution that might result from thermal degra dation. The audience also includes post-graduate students in polymer science and engineering who wish to acquire a more extensive background in rheology and perhaps become specialists in this area. Especially for the latter audience, references are given to more detailed accounts of specialized topics, such as constitutive relations and process simulations. Thus, the book could serve as a textbook for a graduate level course in polymer rheology, and it has been used for this purpose.

IUTAM Symposium on Nonlinear Stochastic Dynamics

Proceedings of the IUTAM Symposium held in Monticello,

Illinois, U.S.A., 26–30 August 2002

Springer Science & Business Media Non-linear stochastic systems are at the center of many engineering disciplines and progress in theoretical research had led to a better understanding of non-linear phenomena. This book provides information on new fundamental results and their applications which are beginning to appear across the entire spectrum of mechanics. The outstanding points of these proceedings are Coherent compendium of the current state of modelling and analysis of non-linear stochastic systems from engineering, applied mathematics and physics point of view. Subject areas include: Multiscale phenomena, stability and bifurcations, control and estimation, computational methods and modelling. For the Engineering and Physics communities, this book will provide first-hand information on recent mathematical developments. The applied mathematics community will benefit from the modelling and information on various possible applications.

Dynamics of Polymeric Liquids: Bird, R. B., Armstrong, R. C., Hassager, O. Fluid mechanics

John Wiley & Sons

Applied Mechanics Reviews

Key Elements in Polymers for Engineers and Chemists

From Data to Applications

CRC Press This book provides comprehensive coverage on the latest developments of research in the ever-expanding area of polymers and advanced materials and their applications to broad scientific fields including physics, chemistry, biology, and materials. It presents physical principles in explaining and rationalizing polymeric phenomena. Featuring

classica

Process-Spray

Functional Particles Produced in Spray Processes

Springer This book describes the latest research on producing functional particles using spray processes. The authors detail micro level elementary processes and phase boundaries, process analysis scaling and modeling, and macro level process functions and particle properties. They include numerical simulations and particulars of experiments for deriving process conditions for particle production.

Chemical Engineering and Chemical Process Technology - Volume VI

Rheology - Part I

EOLSS Publications Chemical Engineering and Chemical Process Technology is a theme 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. Chemical engineering is a branch of engineering, dealing with processes in which materials undergo changes in their physical or chemical state. These changes may concern size, energy content, composition and/or other application properties. Chemical engineering deals with many processes belonging to chemical industry or related industries (petrochemical, metallurgical, food, pharmaceutical, fine chemicals, coatings and colors, renewable raw materials, biotechnological, etc.), and finds application in manufacturing of such products as acids, alkalis, salts, fuels, fertilizers, crop protection agents, ceramics, glass, paper, colors, dyestuffs, plastics, cosmetics, vitamins and many others. It also plays significant role in environmental protection, biotechnology, nanotechnology, energy production and sustainable economical development. The Theme

on Chemical Engineering and Chemical Process Technology deals, in five volumes and covers several topics such as: Fundamentals of Chemical Engineering; Unit Operations – Fluids; Unit Operations – Solids; Chemical Reaction Engineering; Process Development, Modeling, Optimization and Control; Process Management; The Future of Chemical Engineering; Chemical Engineering Education; Main Products, which are then expanded into multiple subtopics, each as a chapter. These five 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.

Fundamentals of Fluid Mechanics

John Wiley & Sons Basic fluid dynamic theory and applications in a single, authoritative reference The growing capabilities of computational fluid dynamics and the development of laser velocimeters and other new instrumentation have made a thorough understanding of classic fluid theory and laws more critical today than ever before. Fundamentals of Fluid Mechanics is a vital repository of essential information on this crucial subject. It brings together the contributions of recognized experts from around the world to cover all of the concepts of classical fluid mechanics- from the basic properties of liquids through thermodynamics, flow theory, and gas dynamics. With answers for the practicing engineer and real-world insights for the student, it includes applications from the mechanical, civil, aerospace, chemical, and other fields. Whether used as a refresher or for first-time learning, Fundamentals of Fluid Mechanics is an important new asset for engineers and students in many different disciplines.

Liquid Crystalline Polymers

Volume 1–Structure and Chemistry

Springer This book introduces anisotropic innovations in liquid crystalline polymers as well as new nanocomposite materials and testing techniques. The authors detail the newest discoveries of material properties, material types and phases, and material characterization. This interdisciplinary work creates valuable links that strengthen the approach to the evolving field of liquid crystalline polymers/ materials.

Cellular and Microcellular Materials

Rheology - Volume II

EOLSS Publications 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, sludges, 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.

Stability of Non-Linear Constitutive Formulations for Viscoelastic Fluids

Springer Science & Business Media Stability of Non-linear Constitutive Formulations for Viscoelastic Fluids provides a complete and up-to-date view of the field of constitutive equations for flowing viscoelastic fluids, in particular on their non-linear behavior, the stability of these constitutive equations that is their predictive power, and the impact of these constitutive 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 formulations are discussed in the light of Hadamard and dissipative type of instabilities.

Foundations of Nanotechnology - Three Volume Set

CRC Press Nanoscale science, engineering, and technology—commonly referred to collectively as nanotechnology—is believed by many to offer extraordinary economic and societal benefits. Nanotechnology is generally defined as the ability to create and use materials, devices, and systems with unique properties at the scale of approximately 1 to 100 nm. Nanotechnology offers society the promise of major benefits, but also raises questions of potential adverse effects. The first volume covers pore size in carbon-based nano-adsorbents, resulting in materials that exhibit unique sorptive properties with a general view of the recent activities on the study of pore structure control. The collection of topics in volume 2 reflects the diversity of recent advances in nanoelements formation and interactions in nanosystems with a broad perspective that will be useful for scientists and engineers as the use of nanotechnology in the consumer and industrial sectors is expected to increase significantly in the future. And the third volume discusses important issues and trends related to research strategy in mechanics of carbon nanotubes.

Optically Active Polymers

Springer Science & Business Media The first four volumes of the series on 'Charged and Reactive Polymers' have been devoted to polymers in solution (Voh. I and II) or in gel and membrane forms (Vols. III and IV). In correlation with charges, other physical or chemical properties of macro molecules have been considered. Understanding of charge and hydrophobic effects is equally important for synthetic and biopolymers or their systems. Optically Active Polymers are related to problems of the same class, since optical activity is an inherent property of both natural macromolecules as well as a great variety of polymers synthesized in the Jast twenty years. Optical activity is a physical spectral property of chiral matter caused by asymmetrical configurations, conformations and structures which have no plane and no center of symmetry and consequently have two mirror image enantiomeric forms of inverse optical rotation. The racemic mixture of chiral enantiomers is optically inactive. The most common form of optical activity was first measured at a constant wavelength by the angle of rotation of linearly polarized light. More recently the measurements have been extended to the entire range of visible and attainable ultraviolet regions where electronic

transitions are observed, giving rise to the ORD technique (Optical Rotatory Dispersion). The Cotton effects appear in the region of optically active absorption bands; outside of these bands the plain curve spectrum is also dependent on all the electronic transitions of the chromophores.

Issues in Mechanical Engineering: 2011 Edition

ScholarlyEditions Issues in Mechanical Engineering / 2011 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Mechanical Engineering. The editors have built Issues in Mechanical Engineering: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Mechanical Engineering in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Mechanical Engineering: 2011 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

Surface and Interfacial Aspects of Biomedical Polymers

Volume 1 Surface Chemistry and Physics

Springer Science & Business Media This book is intended to provide a fundamental basis for the study of the interaction of polymers with living systems, biochemicals, and with aqueous solutions. The surface chemistry and physics of polymeric materials is a subject not normally covered to any significant extent in classical surface chemistry textbooks. Many of the assumptions of classical surface chemistry are invalid when applied to polymer surfaces. Surface properties of polymers are important in the development of medical devices and diagnostic products. Surface properties are also of vital importance in fields such as adhesion, paints and coatings, polymer-filler interactions, heterogeneous catalysis, composites, and polymers for energy generation. The book begins with a chapter considering the current sources of information on polymer surface chemistry and physics. It moves on to consider the question of

the dynamics of polymer surfaces and the implica tions of polymer surface dynamics on all subsequent characterization and interfacial studies. Two chapters are directed toward the question of model polymers for preparing model surfaces and interfaces. Complete treatments of X-ray photoelectron spectroscopy and attenuated total reflection infrared spectroscopy are given. There is a detailed treatment of the contact angle with particular emphasis on contact angle hysteresis in aqueous systems, followed by chapters on interfacial electrochemistry and interface acid-base charge-transfer properties. The very difficult problem of block and graft copolymer surfaces is also discussed. The problem of theoretical calculations of surface and interfacial tensions is presented. Raman spectroscopy is considered as an analytical technique for polymer surface characterization.

Polymer Processing with Supercritical Fluids

iSmithers Rapra Publishing SCFs are currently the subjects of intense research and commercial interest. Applications such as the RESS (rapid expansion of supercritical fluid solutions) process are part of standard industrial practice. In view of their ever-growing importance in the polymer industry there is a need to fully comprehend how supercritical fluids interrelate with polymeric materials to realise the potential that can be gained from their use. The authors review the basic principles of SCFs and their application within the polymer industry: characteristics and properties, extraction of unwanted residual products, polymerisation solvents, and polymer impregnation. Processing applications such as plasticisation, foaming and blending are also considered. There is discussion of the potential within the polymer recycling industry for use of SCFs as cleaning agents or within supercritical oxidation processes. Around 400 references with abstracts from recent global literature accompany this review, sourced from the Polymer Library, to facilitate further reading. A subject index and a company index are included.

Advances in Bioengineering

Cavitation in Non-Newtonian Fluids

With Biomedical and Bioengineering Applications

Springer Science & Business Media Non-Newtonian properties on bubble dynamics and cavitation are fundamentally different from those of Newtonian fluids. The most significant effect arises from the dramatic increase in viscosity of polymer solutions in an extensional flow, such as that generated about a spherical bubble during its growth or collapse phase. In addition, many biological fluids, such as blood, synovial fluid, and saliva, have non-Newtonian properties and can display significant viscoelastic behaviour. This monograph elucidates general aspects of bubble dynamics and cavitation in non-Newtonian fluids and applies them to the fields of biomedicine and bioengineering. In addition it presents many examples from the process industries. The field is strongly interdisciplinary and the numerous disciplines involve have and will continue to overlook and reinvent each others' work. This book helps researchers to think intuitively about the diverse physics of these systems, to attempt to bridge the various communities involved, and to convey the interest, elegance, and variety of physical phenomena that manifest themselves on the micrometer and microsecond scales.

Flow Visualization and Modeling of Liquid Crystalline Polymers

Amorphous Polymers and Non-Newtonian Fluids

Springer Science & Business Media This IMA Volume in Mathematics and its Applications AMORPHOUS POLYMERS AND NON-NEWTONIAN FLUIDS is in part the proceedings of a workshop which was an integral part of the 1984-85 IMA program on CONTINUUM PHYSICS AND PARTIAL DIFFERENTIAL EQUATIONS We are grateful to the Scientific Committee: Haim Brezis Constantine Dafermos Jerry Ericksen David Kinderlehrer for planning and implementing an exciting and stimulating year-long program. We espe cially thank the Program Organizers, Jerry Ericksen, David Kinderlehrer, Stephen Prager and Matthew Tirrell for organizing a workshop which brought together scientists and mathematicians in a variety of areas for a fruitful exchange of ideas. George R. Sell Hans Weinberger Preface Experiences with

amorphous polymers have supplied much of the motivation for developing novel kinds of molecular theory, to try to deal with the more significant features of systems involving very large molecules with many degrees offreedom. Similarly, the observations of many unusual macroscopic phenomena has stimulated efforts to develop linear and nonlinear theories of viscoelasticity to describe them. In either event, we are confronted not with a well-established, specific set of equations, but with a variety of equations, conforming to a loose pattern and suggested by general kinds of reasoning. One challenge is to devise techniques for finding equations capable of delivering definite and reliable predictions. Related to this is the issue of discovering ways to better grasp the nature of solutions ofthose equations showing some promise.