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Fluid Flow and Transport in Porous Media, Mathematical and Numerical Treatment - Zhangxin Chen 2002
This volume contains research papers written and edited by prominent researchers working with the mathematical and numerical treatment of fluid flow and transport in porous media. The papers are based on talks given at a 2001 Joint AMS-IMS-SIAM Summer Research Conference held at Mount Holyoke College (South Hadley, MA). The topics cover a variety of subjects such as network flow modeling,

contemporary numerical methods, parallel computation, optimization, multiscale phenomena, upscaling, uncertainty reduction, well treatment, and media characterization. The material addresses many problems originating from the applied geosciences and focuses on their common state-of-the-art mathematical and numerical treatment. This work is particularly pertinent to those working in oil exploration and other industrial applications. The book serves as an excellent reference work for all geoscientists, mathematicians, physicists, and engineers working in this research area.
Partial Differential Equations in Mechanics 2 - A.P.S. Selvadurai 2013-06-29 This two-volume work focuses on partial differential equations (PDEs) with important applications in mechanical and civil engineering, emphasizing mathematical correctness, analysis, and verification of solutions. The presentation involves a discussion of relevant PDE applications, its derivation, and the formulation of consistent boundary conditions.
Handbook of Fluid Dynamics Richard W. Johnson 2016-04-06 Handbook of Fluid Dynamics offers balanced coverage of the three traditional areas of fluid dynamics-theoretical, computational, and experimental-complete with valuable appendices presenting the mathematics of fluid dynamics, tables of dimensionless numbers, and tables of the properties of gases and vapors. Each chapter introduces a different fluid
The Physics of Composite and Porous Media - T. J. T. (Tim) Spanos 2017-11-06 Building on the success of T.J.T. Spanos's previous book The Thermophysics of Porous Media, The Physics of Composite and Porous Media explains non-linear field theory that describes how physical processes occur in the earth. It describes physical processes associated with the interaction of the various phases at the macroscale (the scale at which continuum equations are

established) and how these interactions give rise to additional physical processes at the megascale (the scale orders of magnitude larger at which a continuum description may once again be established). Details are also given on how experimental, numerical and theoretical work on this subject fits together. This book will be of interest to graduate students and academic researchers working on understanding the physical process in the earth, in addition to those working in the oil and hydrogeology industries.

Dynamics of Fluids in Porous Media - Jacob Bear 1972

Computational Science – ICCS 2009 - Gabrielle Allen 2009-05-19
"There is something fascinating about science. One gets such wholesale returns of conjecture out of such a tri?ing investment of fact. " Mark Twain, Life on the Mississippi The challenges in succeeding with computational science are numerous and deeply a?ect all disciplines. NSF's 2006 Blue Ribbon Panel of Simulation-Based 1 Engineering Science (SBES) states 'researchers and educators [agree]: com-tational and simulation engineering sciences are fundamental to the security and welfare of the United States. . . We must overcome di?culties inherent in multiscale modeling, the development of next-generation algorithms, and the design. . . of dynamic data-driven application systems. . . We must determine better ways to integrate data-intensive computing, visualization, and simulation. -portantly,wemustoverhauloure ducationalsystemtofostertheint erdisciplinary study. . . The payo?sformeeting these challengesareprofound. 'The International Conference on Computational Science 2009 (ICCS 2009) explored how com-tational sciences are not only advancing the traditional hard science disciplines, but also stretching beyond, with applications in the arts,

humanities, media and all aspects of research. This interdisciplinary conference drew academic and industry leaders from a variety of ?elds, including physics, astronomy, mat-matics,music,digitalmedia,biologyandengineering. Theconferencealsohosted computer and computational scientists who are designing and building the - ber infrastructure necessary for next-generation computing. Discussions focused on innovative ways to collaborate and how computational science is changing the future of research. ICCS 2009: 'Compute. Discover. Innovate. ' was hosted by the Center for Computation and Technology at Louisiana State University in Baton Rouge.

Hydraulics of Groundwater Jacob Bear 2012-03-15 This text explores the laws governing the flow and storage of groundwater in aquifers and provides all the necessary tools to forecast the behavior of a regional aquifer system. 1979 edition.

The Handbook of Groundwater Engineering - Jacques W. Delleur 2010-12-12 Due to the increasing demand for adequate water supply caused by the augmenting global population, groundwater production has acquired a new importance. In many areas, surface waters are not available in sufficient quantity or quality. Thus, an increasing demand for groundwater has resulted. However, the residence of time of groundwater can be of the order of thousands of years while surface waters is of the order of days. Therefore, substantially more attention is warranted for transport processes and pollution remediation in groundwater than for surface waters. Similarly, pollution remediation problems in groundwater are generally complex. This excellent, timely resource covers the field of groundwater from an engineering perspective, comprehensively addressing the range of subjects related to subsurface hydrology. It provides a

practical treatment of the flow of groundwater, the transport of substances, the construction of wells and well fields, the production of groundwater, and site characterization and remediation of groundwater pollution. No other reference specializes in groundwater engineering to such a broad range of subjects. Its use extends to: The engineer designing a well or well field The engineer designing or operating a landfill facility for municipal or hazardous wastes The hydrogeologist investigating a contaminant plume The engineer examining the remediation of a groundwater pollution problem The engineer or lawyer studying the laws and regulations related to groundwater quality The scientist analyzing the mechanics of solute transport The geohydrologist assessing the regional modeling of aquifers The geophysicist determining the characterization of an aquifer The cartographer mapping aquifer characteristics The practitioner planning a monitoring network
Stochastic Methods for Flow in Porous Media - Dongxiao Zhang 2001-10-11
Stochastic Methods for Flow in Porous Media: Coping with Uncertainties explores fluid flow in complex geologic environments. The parameterization of uncertainty into flow models is important for managing water resources, preserving subsurface water quality, storing energy and wastes, and improving the safety and economics of extracting subsurface mineral and energy resources. This volume systematically introduces a number of stochastic methods used by researchers in the community in a tutorial way and presents methodologies for spatially and temporally stationary as well as nonstationary flows. The author compiles a number of well-known results and useful formulae and includes exercises at the end of each chapter. Balanced viewpoint of several stochastic methods,

including Greens' function, perturbative expansion, spectral, Feynman diagram, adjoint state, Monte Carlo simulation, and renormalization group methods Tutorial style of presentation will facilitate use by readers without a prior in-depth knowledge of Stochastic processes Practical examples throughout the text Exercises at the end of each chapter reinforce specific concepts and techniques For the reader who is interested in hands-on experience, a number of computer codes are included and discussed

Proceedings of the 2nd International Symposium on Asia Urban GeoEngineering
- Renpeng Chen 2017-11-06 This book contains the keynote presentations, invited speeches, and general session papers presented at the 2nd International Symposium on Asia Urban GeoEngineering, which will be held from 24 November to 27 November 2017 in Changsha, China. The contents will cover the topics of (i) Fundamental behavior and constitutive model of geomaterials, (ii) Excavation and slope engineering, (iii) Tunnel and underground engineering, (iv) Foundation and foundation treatment, (v) Environmental geotechnical engineering, (vi) Numerical methods in geotechnical engineering. It will provide an opportunity to share knowledge and experiences of the analysis, design, construction, and maintenance of urban geoengineering among engineers, researchers, and professors in Asian countries. It will improve our knowledge of requirements of geoengineering for a long-term sustainable urban development and the need to protect and preserve our environment.

Fluids in Porous Media - Henk Huinink 2016-09-06 This book introduces the reader into the field of the physics of processes occurring in porous media. It targets Master and PhD students who need to gain fundamental understanding the impact of confinement on transport and phase change processes. The

book gives brief overviews of topics like thermodynamics, capillarity and fluid mechanics in order to launch the reader smoothly into the realm of porous media. In-depth discussions are given of phase change phenomena in porous media, single phase flow, unsaturated flow and multiphase flow. In order to make the topics concrete the book contains numerous example calculations. Further, as much experimental data as possible is plugged in to give the reader the ability to quantify phenomena.

The Porous Medium Equation - Juan Luis Vazquez 2007 Aimed at research students and academics in mathematics and engineering, as well as engineering specialists, this book provides a systematic and comprehensive presentation of the mathematical theory of the nonlinear heat equation usually called the Porous Medium Equation.

Numerical Treatment of Multiphase Flows in Porous Media - Zhangxin Chen 2008-01-11

The need to predict, understand, and optimize complex physical and c- mical processes occurring in and around the earth, such as groundwater c- tamination, oil reservoir production, discovering new oil reserves, and ocean hydrodynamics, has been increasingly recognized. Despite their seemingly disparate natures, these geoscience problems have many common mathe- tical and computational characteristics. The techniques used to describe and study them are applicable across a broad range of areas. The study of the above problems through physical experiments, mat- matical theory, and computational techniques requires interdisciplinary col- boration between engineers, mathematicians, computational scientists, and other researchers working in industry, government laboratories, and univ- sities. By bringing together such researchers, meaningful progress can be made in predicting, understanding, and

optimizing physical and chemical processes. The International Workshop on Fluid Flow and Transport in Porous - dia was successfully held in Beijing, China, August 2{6, 1999. The aim of this workshop was to bring together applied mathematicians, computational scientists, and engineers working actively in the mathematical and nume- cal treatment of ?uid ?ow and transport in porous media. A broad range of researchers presented papers and discussed both problems and current, state-of-the-art techniques.

Numerical Analysis of Heat and Mass Transfer in Porous Media - J.M.P.Q. Delgado 2012-06-25 The purpose of 'Numerical Analysis of Heat and Mass Transfer in Porous Media' is to provide a collection of recent contributions in the field of computational heat and mass transfer in porous media. The main benefit of the book is that it discusses the majority of the topics related to numerical transport phenomenon in engineering (including state-of-the-art and applications) and presents some of the most important theoretical and computational developments in porous media and transport phenomenon domain, providing a self-contained major reference that is appealing to both the scientists, researchers and the engineers. At the same time, these topics encounter of a variety of scientific and engineering disciplines, such as chemical, civil, agricultural, mechanical engineering, etc. The book is divided in several chapters that intend to be a resume of the current state of knowledge for benefit of professional colleagues.

IUTAM Symposium on Asymptotics, Singularities and Homogenisation in Problems of Mechanics - A.B. Movchan 2004-02-29 Proceedings of the IUTAM Symposium held in Liverpool, UK, 8-11 July 2002

Dielectric Properties of Porous Media - S.O. Gladkov 2013-03-09 This monograph systematically presents the fundamentals of

theoretical and experimental research into the most important physical characteristics of porous structures. Non-standard behavior of certain physical parameters, such as the breakdown of the electric field of porous substances, is described. The method of calculation of the thermal conductivity coefficient of porous dielectrics, based on the non-equilibrium principle, is illustrated in detail. This approach is then applied to the investigation of the properties of "disparate" substances such as cellulose matrices, composites, and fibrous structures. The book is intended for physicists, physical chemists and materials scientists at research and postgraduate levels; it may also be helpful to engineers and technical workers in the applied sciences.

Advances in Fluid Mechanics XII - S. Hernández 2018-10-30
Containing papers from the 12th International Conference on Advances in Fluid Mechanics, this book covers a wide range of topics including basic formulations and their computer modelling as well as the relationship between experimental and analytical results. The emphasis is on new applications and research currently in progress. The field of fluid mechanics is vast and has numerous and diverse applications. The contained research works discuss new studies in fluid mechanics and present the latest applications in the field. A wide range of topics are covered including, Computational methods; Boundary elements and other mesh reduction methods; Fluid structure interaction; Cooling of electronic devices; Environmental fluid dynamics; Industrial applications; Energy systems; Nano and micro fluids; Turbulent and complex flows; Jets; Droplet and spray dynamics; Bubble dynamics; Multiphase fluid flow; Pumping and fluid transportation; Experimental measurements; Rheology; Chemical reaction flow; Hydroelectromagnetic flow; High speed flow; Wave

theory; Energy conversion systems.

Mechanics and Physics of Porous Solids Olivier Coussy 2011-06-28 Mechanics and Physics of Porous Solids addresses the mechanics and physics of deformable porous materials whose porous space is filled by one or several fluid mixtures interacting with the solid matrix. Coussy uses the language of thermodynamics to frame the discussion of this topic and bridge the gap between physicists and engineers, and organises the material in such a way that individual phases are explored, followed by coupled problems of increasing complexity. This structure allows the reader to build a solid understanding of the physical processes occurring in the fluids and then porous solids. Mechanics and Physics of Porous Solids offers a critical reference on the physics of multiphase porous materials - key reading for engineers and researchers in structural and material engineering, concrete, wood and materials science, rock and soil mechanics, mining and oil prospecting, biomechanics.

Calibration and Reliability in Groundwater Modelling Karel Kovar 1996

Groundwater and Seepage - Milton E. Harr 2012-12-04 DIVLogical, analytical approach to solution of groundwater and seepage problems. Coverage of Russian work, advanced engineering mathematics, numerous worked-out examples, over 200 problems. /div

Advances in Porous Media - M.Y. Corapcioglu 1996-12-06 Advances in Porous Media, Volume 3 presents in-depth review papers that give a comprehensive coverage of the field of transport in porous media. This is the third volume in the series which treats transport phenomena in porous media as an interdisciplinary topic. The objective of each chapter is to review the work done on a specific topic including theoretical, numerical as well as experimental studies. All

contributors are from a variety of backgrounds, such as civil and environmental engineering, earth and environmental sciences. The articles are aimed at scientists and engineers from various fields who are concerned with the fundamentals and applications of processes in porous media. Advances in Porous Media, Volume 3 is a valuable source of information for both researchers in the field and those working in other related disciplines.

Heat and Mass Transfer in Porous Media - J.M.P.Q. Delgado 2011-10-08 This book, "Heat and Mass Transfer in Porous Media", presents a set of new developments in the field of basic and applied research work on the physical and chemical aspects of heat and mass transfer phenomena in a porous medium domain, as well as related material properties and their measurements. The book contents include both theoretical and experimental developments, providing a self-contained major reference that is appealing to both the scientists and the engineers. At the same time, these topics will encounter of a variety of scientific and engineering disciplines, such as chemical, civil, agricultural, mechanical engineering, etc. The book is divided in several chapters that intend to be a short monograph in which the authors summarize the current state of knowledge for benefit of professionals.

Gas Transport in Porous Media - Clifford K. Ho 2006-10-07 CLIFFORD K. HOAND STEPHEN W. WEBB Sandia National Laboratories, P. O. Box 5800, Albuquerque, NM 87185, USA Gas and vapor transport in porous media occur in a number of important applications includingdryingofindustrialandfoodproducts,oilandgasexploration,environm- tal remediation of contaminated sites, and carbon sequestration. Understanding the fundamental mechanisms and processes of gas and vapor transport in porous media allows models to be used to evaluate and optimize the

performance and design of these systems. In this book, gas and vapor are distinguished by their available states at stan- ? dard temperature and pressure (20 C, 101 kPa). If the gas-phase constituent can also exist as a liquid phase at standard temperature and pressure (e. g. , water, ethanol, toluene, trichlorothylene), it is considered a vapor. If the gas-phase constituent is non-condensable at standard temperature and pressure (e. g. , oxygen, carbon di- ide, helium, hydrogen, propane), it is considered a gas. The distinction is important because different processes affect the transport and behavior of gases and vapors in porous media. For example, mechanisms specific to vapors include vapor-pressure lowering and enhanced vapor diffusion, which are caused by the presence of a g- phase constituent interacting with its liquid phase in an unsaturated porous media. In addition, the "heat-pipe" exploits isothermal latent heat exchange during evaporation and condensation to effectively transfer heat in designed and natural systems.

Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface - Todd H. Wiedemeier 1999-03-08
The first comprehensive guide to one of today's most innovative approaches to environmental contamination Natural attenuation is gaining increasing attention as a nonintrusive, cost-effective alternative to standard remediation techniques for environmental contamination. This landmark work presents the first in-depth examination of the theory, mechanisms, and application of natural attenuation. Written by four internationally recognized leaders in this approach, the book describes both biotic and abiotic natural attenuation processes, focusing on two of the environmental contaminants most frequently encountered in groundwater-- fuels and chlorinated solvents. The authors draw on a wealth of combined experience to detail successful techniques for simulating natural attenuation

processes and predicting their effectiveness in the field. They also show how natural attenuation works in the real world, using numerous examples and case studies from a wide range of leading-edge projects nationwide involving fuel hydrocarbons and chlorinated solvents. Finally, they discuss the evaluation and assessment of natural attenuation and explore the design of long-term monitoring programs. An indispensable reference for anyone working in environmental remediation, Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface is essential reading for scientists and engineers in a range of industries, as well as state and federal environmental regulators, and professors and graduate students in environmental or chemical engineering.

The Handbook of Groundwater Engineering - John H. Cushman 2016-11-25
This new edition adds several new chapters and is thoroughly updated to include data on new topics such as hydraulic fracturing, CO_2 sequestration, sustainable groundwater management, and more. Providing a complete treatment of the theory and practice of groundwater engineering, this new handbook also presents a current and detailed review of how to model the flow of water and the transport of contaminants both in the unsaturated and saturated zones, covers the protection of groundwater, and the remediation of contaminated groundwater.

Modeling Approaches to Natural Convection in Porous Media - Yan Su 2015-03-12
This book provides an overview of the field of flow and heat transfer in porous medium and focuses on presentation of a generalized approach to predict drag and convective heat transfer within porous medium of arbitrary microscopic geometry, including reticulated foams and packed beds. Practical numerical methods to solve natural convection problems in

porous media will be presented with illustrative applications for filtrations, thermal storage and solar receivers.

Dynamics of Fluids in Porous Media - Jacob Bear 2013-02-26 This is the definitive work on the subject by one of the world's foremost hydrologists, designed primarily for advanced undergraduate and graduate students. 335 black-and-white illustrations. Exercises, with answers.

Mathematical Modelling Of Flow Through Porous Media - Proceedings Of The Conference - Bourgeat Alain P 1995-11-30 Since the first edition of this book the literature on fitted mesh methods for singularly perturbed problems has expanded significantly. Over the intervening years, fitted meshes have been shown to be effective for an extensive set of singularly perturbed partial differential equations. In this revised version of this book, the reader will find an introduction to the basic theory associated with fitted numerical methods for singularly perturbed differential equations. Fitted mesh methods focus on the appropriate distribution of the mesh points for singularly perturbed problems. The global errors in the numerical approximations are measured in the pointwise maximum norm. The fitted mesh algorithm is particularly simple to implement in practice, but the theory of why these numerical methods work is far from simple. This book can be used as an introductory text to the theory underpinning fitted mesh methods.

Essentials of Heat and Fluid Flow in Porous Media - Arunn Narasimhan 2022 This textbook provides a general overview of porous media flow, and introduces various theoretical tools to characterize and predict the flow. It has been written for graduate and advanced graduate students in various engineering disciplines. It includes the topics such as fluid flow, conduction, convection, and radiation in porous media as well as porous

medium aspects of biological systems. The concepts are supported by numerous solved examples to aid self-learning in students. The textbook also contains illustrated diagrams for better understanding of the concepts. This textbook will be useful for the core course of "Flow through Porous media" for graduate and advanced graduate students in various engineering disciplines. This textbook will also serve as a refresher course for researchers who are engaged in research related to porous media flow.

Handbook of Porous Media - Kambiz Vafai 2015-06-23 Handbook of Porous Media, Third Edition offers a comprehensive overview of the latest theories on flow, transport, and heat-exchange processes in porous media. It also details sophisticated porous media models which can be used to improve the accuracy of modeling in a variety of practical applications. Featuring contributions from leading experts in their respective fields, this book: Presents the general characteristics and modeling of porous media, such as multiscale modeling of porous media, two-phase flow, compressible porous media, and dispersion in porous media Addresses the fundamental topics of transport in porous media, including theoretical models of transport, membrane transport phenomena, modeling transport properties, and transport in biomedical applications Describes several important aspects of turbulence in porous media, including advances in modeling turbulence phenomena in heterogeneous porous media Explores heat transfer of nanofluids as well as thermal transport in porous media, including forced convection, double diffusive convection, high-heat flux applications, and thermal behavior of poroelastic media Covers geological applications in porous media, including modeling and experimental challenges related to oil fields, CO_2 migration, groundwater flows, and velocity measurements

Discusses relevant attributes of experimental work or numerical techniques whenever applicable Paving the way for the establishment of multidisciplinary areas of research, Handbook of Porous Media, Third Edition further enhances cooperation between engineers and scientists by providing a valuable reference for addressing some of the most challenging issues in engineering and the hydrogeological, biological, and biomedical sciences.
Physical Hydrodynamics - Etienne Guyon 2015 Exercises have also been added at the end of a number of chapters.
Computation and Applied Mathematics - 2004

Routes to Absolute Instability in Porous Media - Antonio Barletta 2019-01-02 This book addresses the concepts of unstable flow solutions, convective instability and absolute instability, with reference to simple (or toy) mathematical models, which are mathematically simple despite their purely abstract character. Within this paradigm, the book introduces the basic mathematical tools, Fourier transform, normal modes, wavepackets and their dynamics, before reviewing the fundamental ideas behind the mathematical modelling of fluid flow and heat transfer in porous media. The author goes on to discuss the fundamentals of the Rayleigh-Bénard instability and other thermal instabilities of convective flows in porous media, and then analyses various examples of transition from convective to absolute instability in detail, with an emphasis on the formulation, deduction of the dispersion relation and study of the numerical data regarding the threshold of absolute instability. The clear descriptions of the analytical and numerical methods needed to obtain these parametric threshold data enable readers to apply them in different or more general cases. This book is of interest to postgraduates and researchers in mechanical and thermal engineering, civil

engineering, geophysics, applied mathematics, fluid mechanics, and energy technology.
Upscaling of Single- and Two-Phase Flow in Reservoir Engineering- Hans Bruining 2021-11-15 This book describes fundamental upscaling aspects of single-phase/two-phase porous media flow for application in petroleum and environmental engineering. Many standard texts have been written about this subject. What distinguishes this work from other available books is that it covers fundamental issues that are frequently ignored but are relevant for developing new directions to extend the traditional approach, but with an eye on application. Our dependence on fossil energy is 80–90% and is only slowly decreasing. Of the estimated 37 (~40) Gton/year, anthropogenic emissions of about 13 Gton/year of carbon dioxide remain in the atmosphere. An Exergy Return on Exergy Invested analysis shows how to obtain an unbiased quantification of the exergy budget and the carbon footprint. Thus, the intended audience of the book learns to quantify his method of optimization of recovery efficiencies supported by spreadsheet calculations. As to single-phase-one component fluid transport, it is shown how to deal with inertia, anisotropy, heterogeneity and slip. Upscaling requires numerical methods. The main application of transient flow is to find the reasons for reservoir impairment. The analysis benefits from solving the porous media flow equations using (numerical) Laplace transforms. The multiphase flow requires the definition of capillary pressure and relative permeabilities. When capillary forces dominate, we have dispersed (Buckley-Leverett flow). When gravity forces dominate, we obtain segregated flow (interface models). Miscible flow is described by a convection-dispersion equation. We give a simple proof that the

dispersion coefficient can be approximated by Gelhar's relation, i.e., the product of the interstitial velocity, the variance of the logarithm of the permeability field and a correlation length. The book will appeal mostly to students and researchers of porous media flow in connection with environmental engineering and petroleum engineering.

Partial Differential Equations in Mechanics 1 - A.P.S. Selvadurai 2000-10-19 This two-volume work focuses on partial differential equations (PDEs) with important applications in mechanical and civil engineering, emphasizing mathematical correctness, analysis, and verification of solutions. The presentation involves a discussion of relevant PDE applications, its derivation, and the formulation of consistent boundary conditions.

Mechanics of Groundwater in Porous Media - Muhammad I. Haque 2014-07-23 Provides a Balance between the Mathematical and Physical Aspects and the Engineering Applications Written for engineering and science students, Mechanics of Groundwater in Porous Media explains groundwater from both a mathematical and qualitative standpoint. The book builds up the theory of groundwater flow starting from basic physics and geometric intuition, and on to applied practice through real-world engineering problems. It includes graphical illustrations as well as solved illustrative problems throughout the text. Considers the Steady-State Motion of Groundwater The book starts off by introducing the overall picture of groundwater, its relationship with the hydrological cycle, and other terminology used in the mechanics of groundwater flow though porous means. It presents a synopsis of basic definitions, concepts, and the fundamental principles of fluid mechanics and soil mechanics, which are necessary prerequisites for an adequate understanding of the book's core material. The engineering

applications are deducted from geometric and physical reasoning, with a minimum use of mathematical abstraction. Mechanics of Groundwater in Porous Media is written primarily to serve as a textbook for senior undergraduate and upper-level graduate students in civil and environmental engineering, environmental science, hydrogeology, and geology, as well as a resource for practicing engineers.

Selected Topics of Computational and Experimental Fluid Mechanics - Jaime Klapp 2015-03-05
This book contains invited lectures and selected contributions presented at the Enzo Levi and XIX Annual Meeting of the Fluid Dynamic Division of the Mexican Physical Society in 2013. It is aimed at fourth year undergraduate and graduate students, and scientists in the fields of physics, engineering and chemistry who are interested in fluid dynamics from an experimental and theoretical point of view. The invited lectures are introductory and avoid the use of complicated mathematics. The fluid dynamics applications include multiphase flow, convection, diffusion, heat transfer, rheology, granular material, viscous flow, porous media flow, geophysics and astrophysics. The material contained in the book includes recent advances in experimental and theoretical fluid dynamics and is suitable for both teaching and research.

Emerging Technologies and Techniques in Porous Media - 2004

Principles of Heat Transfer in Porous Media - M. Kaviany 2012-12-06
Although the empirical treatment of fluid flow and heat transfer in porous media is over a century old, only in the last three decades has the transport in these heterogeneous systems been addressed in detail. So far, single-phase flows in porous media have been treated or at least formulated satisfactorily, while the subject of two-phase

flow and the related heat-transfer in porous media is still in its infancy. This book identifies the principles of transport in porous media and compares the avalaible predictions based on theoretical treatments of various transport mechanisms with the existing experimental results. The theoretical treatment is based on the volume-averaging of the momentum and energy equations with the closure conditions necessary for obtaining solutions. While emphasizing a basic understanding of heat transfer in porous media, this book does not ignore the need for predictive tools; whenever a rigorous theoretical treatment of a phenomena is not avaliable, semi-empirical and empirical treatments are given.

Transport Processes in Porous Media - Frank A. Coutelieris 2012-01-25 The subject of this book is to study the porous media and the transport processes occur there. As a first step, the authors discuss several techniques for artificial representation of porous. Afterwards, they describe the single and multi phase flows in simplistic and complex porous structures in terms of macroscopic and microscopic equations as well as of their analytical and numerical solutions. Furthermore, macroscopic quantities such as permeability are introduced and reviewed. The book also discusses with mass transport processes in the porous media which are further strengthen by experimental validation and specific technological applications. This book makes use of state-of-the-art techniques for the modeling of transport processes in porous structures, and considers of realistic sorption mechanisms. It the applies advanced mathematical techniques for upscaling of the major quantities, and presents the experimental investigation and application, namely, experimental methods for the measurement of relevant transport properties. The main benefit of the book is that it

discusses all the topics related to transport in porous media (including state-of-the-art applications) and presents some of the most important theoretical, numerical and experimental developments in porous media domain, providing a self-contained major reference that is appealing to both the scientists and the engineers. At the same time, these topics encounter a variety of scientific and engineering disciplines, such as chemical, civil, agricultural, mechanical engineering. The book is divided in several chapters that intend to be a resume of the current state of knowledge for benefit of related professionals and scientists.