



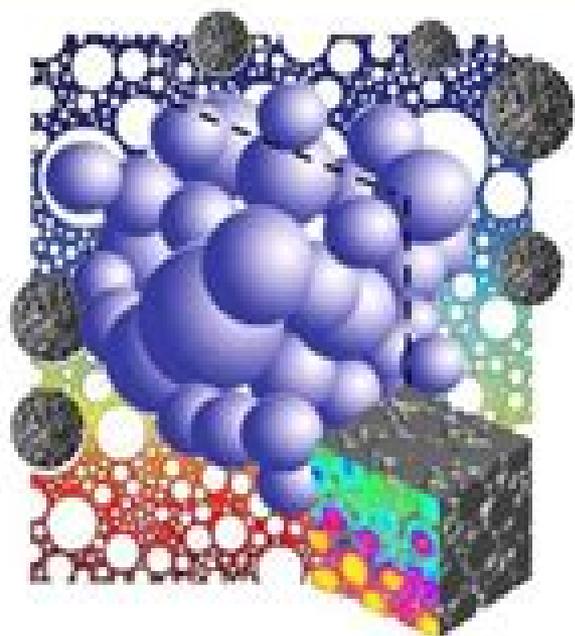
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Advanced Structured Materials

Frank A. Coutelieres
J. M. P. Q. Delgado



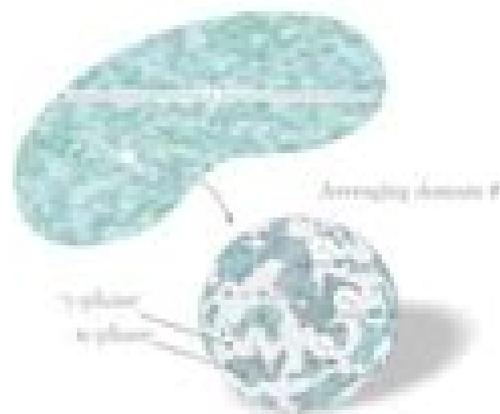
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Transport Processes in Porous Media



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Transport Processes In Porous Media

Jacob Bear



Transport Processes In Porous Media:

Transport Processes in Porous Media Frank A. Coutelieiris, J.M.P.Q. Delgado, 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

Transport Processes in Porous Media

Jacob Bear, M. Yavuz Corapcioglu, 2012-12-06 This volume contains the invited lectures presented during the NATO ASI conducted in Pullman Washington July 9 18 1989 This is the third in a series of NATO ASIs on transport phenomena in porous media The first two which took place at Newark Delaware in 1982 and 1985 are devoted to various topics related to the Fundamentals of Transport Processes in Porous Media The contents of the books resulting from previous NATO ASIs are given at the end of this book Transport of extensive quantities such as mass of a fluid phase mass of chemical species carried by a fluid phase energy and electric charge in porous media as encountered in a large variety of engineering disciplines is an emerging interdisciplinary field The groundwater flow the simultaneous flow of gas oil and water in petroleum reservoirs the movement and accumulation of pollutants in the saturated and unsaturated subsurface zones thermal energy storage in reservoirs land subsidence in response to charges in overburden loads or to pumping of fluids from underground formations wave propagation in seismic investigations or as produced by earthquakes chemical reactors water flow through sand filters and the movement of fluids through kidneys may serve as examples of fields in which the theory of transport in porous media is employed

Modelling Reactive Transport Processes in Porous Media Haibing Shao, 2009 **Modelling of Transport**

Processes in Porous Media for Energy Applications Markku Kangas, 1996 **A Theory of Transport Processes in**

Porous Media Florian K. Lehner, 1979 Multiscale Modeling and Simulation of Transport Processes in Porous Media

Carina Bringedal,2022 *Modeling Transport Phenomena in Porous Media with Applications* Malay K. Das,Partha P. Mukherjee,K. Muralidhar,2017-11-21 This book is an ensemble of six major chapters an introduction and a closure on modeling transport phenomena in porous media with applications Two of the six chapters explain the underlying theories whereas the rest focus on new applications Porous media transport is essentially a multi scale process Accordingly the related theory described in the second and third chapters covers both continuum and meso scale phenomena Examining the continuum formulation imparts rigor to the empirical porous media models while the mesoscopic model focuses on the physical processes within the pores Porous media models are discussed in the context of a few important engineering applications These include biomedical problems gas hydrate reservoirs regenerators and fuel cells The discussion reveals the strengths and weaknesses of existing models as well as future research directions

Visualization and Quantification of Transport Processes in Porous Media Using Micromodels Sabina Chowdhury,1996 Porous Media José Luis Acosta,2009 A porous material is a solid that is saturated by an interconnected network of pores filled with liquid or gas It is an inorganic or organic cross linked or uncross linked containing pores of all sizes The pore network is assumed to be continuous forming two interpenetrating continua such as in a sponge Examples of porous media range from porous silicon which is porous on the sub manometer scale to limestone caves and underground river systems on the kilometre scale Most research on porous media analyses the transport processes in a macro scale approximation This book focuses on semi analytical solutions for thermo poroelasticity field equations pore size from units to hundreds of micro meters and assumptions and reactive processes as well as the mathematical formulations of these models It represents the different concepts of porous media as it is used in many areas of applied science and engineering This book presents current activities and new advances of porous media throughout the world

General Theory of Transport Processes Related to Fluid Flow Through Porous Media Jacob Bear,1969 *On the Upscaling of Reaction-Transport Processes in Porous Media with Fast Kinetics* ,2001 This report is organized as follows Provide a brief review of the upscaling constraints of the type 2 for a typical diffusion reaction system In this an analogy with two phase flow in porous media was drawn Then using the methodology of QW a problem at the unit cell for the computation of the effective mass transfer coefficient in processes where local thermodynamic equilibrium applies was derived This problem is found to be different than in QW as it depends on the gradients of the macroscale variable and can be cast in terms of an eigenvalue problem Two simple examples one involving advection dissolution and another involving drying in a pore network was presented to illustrate the coupling between scales and to show the quantitative effect in case this coupling was neglected Finally similar ideas and an illustrative example was applied to reaction diffusion systems with fast kinetics where an equilibrium state is approached

Intensification of Transport Processes in Fluid-Filled Porous Media by Sound Waves. Application to Fuel Cell Technology ,2004 In this work we aim developing a novel theoretical framework to evaluate the feasibility of attaining

significant improvement of fuel cells performance and stability by increasing the transport processes in porous partially fluid filled cathode compartment through the application of acoustic and structural waves We have developed a unified model of structural acoustic wave propagation in the PEM cathode compartment and coupled it with mass transfer in the porous media A novel generalized filtration law that accounts for dynamic loadings varying saturation and solid structure distortion describing mass transfer in this complex but generic system has been found It has been demonstrated that vibration gives rise to net change of saturation inside porous medium Based on the numerical and experimental results number of practical recommendations optimizing material selections and performance regime has been made Developed methodology is useful for wide range of Fuel Cell problems as well as for wide range of other porous structures and could serve as an important design tool

Transient, Non-thermal Equilibrium, Multi-phase Transport Processes in Porous Media Mehmet F. Sözen, Kambiz Vafai, 1989

Computers Simulation of Particle Transport Processes in Porous Media Abdussalam Omar Imdakm, 1991

Analytical Solutions for Some Chemical Transport Processes in Porous Media Alexandros Viktor Angelos Stamatiou, 2018

The Prediction of Transport Processes Occurring Within Unconsolidated Porous Media Graham Henry Neale, 1972

Gas Transport in Porous Media Clifford K. Ho, Stephen W. Webb, 2006-10-07

CLIFFORD K HO AND 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 including drying of industrial and food products oil and gas exploration environmental 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 standard 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 trichloroethylene it is considered a vapor If the gas phase constituent is non condensable at standard temperature and pressure e.g. oxygen carbon dioxide 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 liquid 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

Capillary Transport Processes in Porous Materials Nicolas Fries, 2010

Non-local Models for Upscaling of Reaction and Transport Processes in Porous Media Persefoni E. Kechagia, 2001

Analytical Homogenisation of Transport Processes in Evolving Porous Media David Wiedemann, 2023

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