Discover approaches to effectively apply porous media concepts to biomedical applications

Porous Media
Applications in Biological Systems and Biotechnology
Edited by Kambiz Vafai • University of California, Riverside, USA

The First Book to Cover the Applications of Porous Media Theory in Biomedical and Biological Sciences

Presenting state-of-the-art research advancements, Porous Media: Applications in Biological Systems and Biotechnology explores innovative approaches to effectively apply existing porous media technologies to biomedical applications. In each peer-reviewed chapter, world-class scientists and engineers collaborate to address significant problems and discuss exciting research in biological systems.

The book begins with discussions on bioheat transfer equations for blood flows and surrounding biological tissue, the concept of electroporation, hydrodynamic modeling of tissue-engineered material, and the resistance of microbial biofilms to common modalities of antibiotic treatments. It examines how biofilms influence porous media hydrodynamics, describes the modeling of flow changes in cerebral aneurysms, and highlights recent advances in Lagrangian particles methods. The text also covers passive mass transport processes in cellular membranes and their biophysical implications, the modeling and treatment of mass transport through skin, the use of porous media in marine microbiology, the transport of large biological molecules in deforming tissues, and applications of magnetic stabilized beds for protein purification and adsorption, antibody removal, and more. The final chapters present potential in situ characterization techniques for studying porous media and conductive membranes and explain the development of bioconvection patterns generated by populations of gravitactic microorganisms in porous media.

Using a common nomenclature throughout and with contributions from top experts, this cohesive book illustrates the role of porous media in addressing some of the most challenging issues in biomedical engineering and biotechnology. The book contains sophisticated porous media models that can be used to improve the accuracy of modeling a variety of biological processes.

FEATURES

• Explores state-of-the-art research advances related to the applications of porous media in biological systems and biotechnology
• Covers various transport processes, mechanical behavior, and material properties of biological tissues from a porous media point of view
• Presents pertinent aspects of experimental work and numerical techniques
• Discusses the modeling of several phenomena, including flow changes in cerebral aneurysms, biomass growth, marine systems, and tissue homeostasis and repair

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