

New Trends in the Physics and Mechanics of Biological Systems: Lecture Notes of the Les Houches Summer School: Volume 92, July 2009

By Martine Ben Amar, Alain Goriely, Martin Michael Muller, Leticia Cugliandolo


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In July 2009, many experts in the mathematical modeling of biological sciences gathered in Les Houches for a 4-week summer school on the mechanics and physics of biological systems. The goal of the school was to present to students and researchers an integrated view of new trends and challenges in physical and mathematical aspects of biomechanics. While the scope for such a topic is very wide, they focused on problems where solid and fluid mechanics play a central role. The school covered both the general mathematical theory of mechanical biology in the context of continuum mechanics but also the specific modeling of particular systems in the biology of the cell, plants, microbes, and in physiology.

These lecture notes are organized (as was the school) around five different main topics all connected by the common theme of continuum modeling for biological systems: Bio-fluidics, Bio-gels, Bio-mechanics, Bio-membranes, and Morphogenesis. These notes are not meant as a journal review of the topic but rather as a gentle tutorial introduction to the readers who want to understand the basic problematic in modeling biological systems from a mechanics perspective.

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Editorial Review

Review

This book collects and organises current material covering an extremely broad field of study, and for this reason it should be carefully read. Contemporary Physics

About the Author

Martine Ben Amar is a Professor at Universite Pierre et Marie Curie and Ecole Normale Supérieure. Alain Goriely is Professor of Mathematical Modelling and Director of the Oxford Centre for Collaborative Applied Mathematics at Oxford University. Martin Michael Muller works as a Maître de conférences in research at Paul-Verlaine University. Leticia Cugliandolo is a Professor at the Laboratory of Theoretical Physics and High Energy at Universite Pierre et Marie Curie.

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