



Multiphysics and Multiscale Modeling: Techniques and Applications

Young W. Kwon

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Written to appeal to a wide field of engineers and scientists who work on multiscale and multiphysics analysis, **Multiphysics and Multiscale Modeling: Techniques and Applications** is dedicated to the many computational techniques and methods used to develop man-made systems as well as understand living systems that exist in nature. Presenting a body of research on multiscale and multiphysics analysis collected by the author over the years, this book provides an assessment of multiple computational techniques that include the finite element method, lattice Boltzmann method, cellular automata, and the molecular dynamics technique. The author also presents a number of example problems relevant to multiphysics and multiscale analyses, and introduces the proper coupling techniques that can be used in conjunction with computational methods to solve a multitude of multiscale and multiphysics problems.

In addition, this detailed book:

- Provides a simplified analysis for crystalline structures using the finite element method and molecular dynamics
- Discusses multiscale analysis of biomaterials using human bones as an example
- Presents multiphysics problems for composite structures
- Includes fluidstructure interaction for composite structures surrounded by water
- Contains an example of the multiphysics analysis of electromechanical problems
- Introduces a multiphysics analysis of biomechanics using the example of blood vessels (for which there is fluid-structure interaction)

Multiphysics and Multiscale Modeling: Techniques and Applications emphasizes the use of multiphysics and multiscale techniques to aid in the understanding and development of complex physical behaviors and systems. This book serves as a resource in mechanical engineering, bioengineering, and materials engineering study, practice, and research.

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