Multiphysics modeling with application to biomedical engineering

Z. Yang, CRC Press, 2020 (c2021)

174p bibl index ISBN 9780367509767, $130.00

This short, single-authored textbook presents the physical underpinnings and implementation of continuum-level multiphysics modeling for biomedical systems. Though the governing equations are general, all implementation is presented as finite-elements modeling using a commercial computing platform (ANSYS Fluent). Computer code examples, including complete input files and parameter values, are presented in the appendixes, enabling readers to perform their own calculations. The text is organized into sections of increasing complexity, beginning with a single "physics phase," then moving to the coupling between two physics phases, and ending with examples involving more than two phases. Chapters are brief (2–12 pages). Independent scholar and professional engineer Yang (PhD, Univ. of Pittsburgh) adopts a direct writing style, avoiding tangential anecdotes. The black-and-white figures, typeset equations, and tables of parameter values for multiphysics simulations are well utilized and contribute to readers' overall understanding. Some practical biomedical examples include compression of an intravertebral disk, blood flow through a stenotic artery, and heat generation in biological tissues. All this material has been presented in previous engineering textbooks and research monographs. What makes this treatment unique is its brevity and concision—those features should appeal equally to interested students and practitioners.

Reviewer: M. R. King, Vanderbilt University

Recommendation: Recommended

Readership Level: Upper-division undergraduates. Graduate students, faculty, and professionals.

Subject: Science & Technology, Health Sciences

Choice Issue: Nov 2022 vol. 60 no. 3

Choice Review #: 60-0816