



Mathematical Modeling in Science and Engineering: An Axiomatic Approach

Ismael Herrera, George F. Pinder

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A powerful, unified approach to mathematical and computational modeling in science and engineering

Mathematical and computational modeling makes it possible to predict the behavior of a broad range of systems across a broad range of disciplines. This text guides students and professionals through the axiomatic approach, a powerful method that will enable them to easily master the principle types of mathematical and computational models used in engineering and science. Readers will discover that this axiomatic approach not only enables them to systematically construct effective models, it also enables them to apply these models to any macroscopic physical system.

Mathematical Modeling in Science and Engineering focuses on models in which the processes to be modeled are expressed as systems of partial differential equations. It begins with an introductory discussion of the axiomatic formulation of basic models, setting the foundation for further topics such as:

- Mechanics of classical and non-classical continuous systems
- Solute transport by a free fluid
- Flow of a fluid in a porous medium
- Multiphase systems
- Enhanced oil recovery
- Fluid mechanics

Throughout the text, diagrams are provided to help readers visualize and better understand complex mathematical concepts. A set of exercises at the end of each chapter enables readers to put their new modeling skills into practice. There is also a bibliography in each chapter to facilitate further investigation of individual topics.

Mathematical Modeling in Science and Engineering is ideal for both students and professionals across the many disciplines of science and engineering that depend on mathematical and computational modeling to predict and understand complex systems.

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