Continuum modeling in the physical sciences

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Abstrak

Mathematical modeling he ability to apply mathematical concepts and techniques to real-life systems as expanded considerably over the last decades, making it impossible to cover all of its aspects in one course or textbook. Continuum Modeling in the Physical Sciences provides an extensive exposition of the general principles and methods of this growing field with a focus on applications in the natural sciences. The authors present a thorough treatment of mathematical modeling from the elementary level to more advanced concepts.

Most of the chapters are devoted to a discussion of central issues such as dimensional analysis, conservation principles, balance laws, constitutive relations, stability, robustness, and variational methods, and are accompanied by numerous real-life examples. Readers will benefit from the exercises placed throughout the text and the Challenging Problems sections found at the ends of several chapters. The last chapter is devoted to extensively worked-out case studies in polymer dynamics, fiber spinning, water waves, and waveguide optics.