



# Continuum Mechanics: The Birthplace of Mathematical Models

*Myron B. Allen*

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# Continuum Mechanics: The Birthplace of Mathematical Models

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**Continuum Mechanics: The Birthplace of Mathematical Models** Myron B. Allen

**Presents a self-contained introduction to continuum mechanics that illustrates how many of the important partial differential equations of applied mathematics arise from continuum modeling principles**

Written as an accessible introduction, *Continuum Mechanics: The Birthplace of Mathematical Models* provides a comprehensive foundation for mathematical models used in fluid mechanics, solid mechanics, and heat transfer. The book features derivations of commonly used differential equations based on the fundamental continuum mechanical concepts encountered in various fields, such as engineering, physics, and geophysics.

The book begins with geometric, algebraic, and analytical foundations before introducing topics in kinematics. The book then addresses balance laws, constitutive relations, and constitutive theory. Finally, the book presents an approach to multiconstituent continua based on mixture theory to illustrate how phenomena, such as diffusion and porous-media flow, obey continuum-mechanical principles.

*Continuum Mechanics: The Birthplace of Mathematical Models* features:

- Direct vector and tensor notation to minimize the reliance on particular coordinate systems when presenting the theory
- Terminology that is aligned with standard courses in vector calculus and linear algebra
- The use of Cartesian coordinates in the examples and problems to provide readers with a familiar setting
- Over 200 exercises and problems with hints and solutions in an appendix
- Introductions to constitutive theory and multiconstituent continua, which are distinctive for books at this level

*Continuum Mechanics: The Birthplace of Mathematical Models* is an ideal textbook for courses on continuum mechanics for upper-undergraduate mathematics majors and graduate students in applied mathematics, mechanical engineering, civil engineering, physics, and geophysics. The book is also an excellent reference for professional mathematicians, physical scientists, and engineers.

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