A First Course in Continuum Mechanics (Cambridge Texts in Applied Mathematics)

By Professor Oscar Gonzalez, Professor Andrew M. Stuart

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A concise account of various classic theories of fluids and solids, this book is for courses in continuum mechanics for graduate students and advanced undergraduates. Thoroughly class-tested in courses at Stanford University and the University of Warwick, it is suitable for both applied mathematicians and engineers. The only prerequisites are an introductory undergraduate knowledge of basic linear algebra and differential equations. Unlike most existing works at this level, this book covers both isothermal and thermal theories. The theories are derived in a unified manner from the fundamental balance laws of continuum mechanics. Intended both for classroom use and for self-study, each chapter contains a wealth of exercises, with fully worked solutions to odd-numbered questions. A complete solutions manual is available to instructors upon request. Short bibliographies appear at the end of each chapter, pointing to material which underpins or expands upon the material discussed.

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Editorial Review

Review
"Designed for advanced undergraduate and early graduate students in engineering and mathematics, this introductory text is rich with exercises, making it also suitable for self-study for readers with a basic knowledge of linear algebra, multivariate calculus, differential equations and physics. Gonzalez (mathematics, U. of Texas) and Stuart (mathematics, U. of Warwick) keep in mind fields in which the modeling and simulation of materials with significant coupling and thermal effects as they explain tensor algebra and tensor calculus, then give comprehensive coverage of continuum mass and force concepts, kinematics, balance laws, isothermal fluid and solid mechanics and thermal fluid and solid mechanics. Their bibliographical notes are likely to be very helpful to those studying outside the classroom, and they provide an index which should serve as a model for mathematical texts."
Book News, Inc.

"This book...covers its topics exhaustively and in great detail ... the detailed examples are also very useful for lecturers." - Axel Maas, Mathematical Reviews

About the Author
Oscar Gonzalez is an Associate Professor of Mathematics at the University of Texas. His research interests cover computational and applied mathematical problems related to the large-scale deformations of thin rods and ribbons, and more general three-dimensional bodies. He has contributed articles to numerous journals across mathematics, engineering and chemistry. His current research efforts are directed toward understanding the mechanical properties of DNA at various length scales.

Andrew Stuart is Professor of Mathematics at the University of Warwick. His general research interests cover computational stochastic processes and dynamical systems and his current research efforts are directed mainly towards problems at the interface of applied mathematics and statistics. He has contributed articles to numerous journals across mathematics, engineering and physics and is the recipient of six prizes for his work in Applied Mathematics.

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