Elasticity with Mathematica

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Elasticity with MATHEMATICA®

An Introduction to Continuum Mechanics and Linear Elasticity
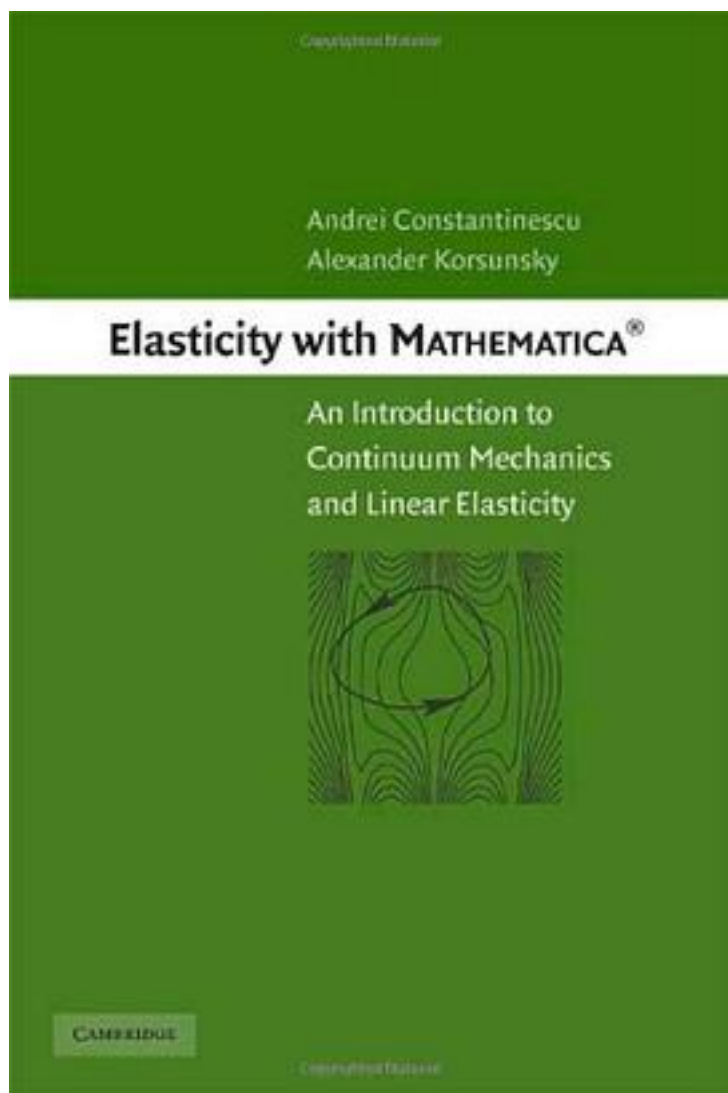
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This book, first published in 2007, introduces key ideas and principles in the theory of elasticity with the help of symbolic computation. Differential and integral operators on vector and tensor fields of displacements, strains and stresses are considered on a consistent and rigorous basis with respect to curvilinear orthogonal coordinate systems. As a consequence, vector and tensor objects can be manipulated readily, and fundamental concepts can be illustrated and problems solved with ease. The method is illustrated using a variety of plane and three-dimensional elastic problems. General theorems, fundamental solutions, displacements and stress potentials are presented and discussed. The Rayleigh-Ritz method for obtaining approximate solutions is introduced for elastostatic and spectral analysis problems. Containing more than 60 exercises and solutions in the form of Mathematica notebooks that accompany every chapter, the reader can learn and master the techniques while applying them to a large range of practical and fundamental problems.

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