



# Non-linear Modeling and Analysis of Solids and Structures

By Steen Krenk

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This book presents a theoretical treatment of nonlinear behavior of solids and structures in such a way that it is suitable for numerical computation, typically using the Finite Element Method. Starting out from elementary concepts, the author systematically uses the principle of virtual work, initially illustrated by truss structures, to give a self-contained and rigorous account of the basic methods. The author illustrates the combination of translations and rotations by finite deformation beam theories in absolute and co-rotation format, and describes the deformation of a three-dimensional continuum in material form. A concise introduction to finite elasticity is followed by an extension to elasto-plastic materials via internal variables and the maximum dissipation principle. Finally, the author presents numerical techniques for solution of the nonlinear global equations and summarizes recent results on momentum and energy conserving integration of time-dependent problems. Exercises, examples and algorithms are included throughout.

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Steen Krenk is Professor of Structural Mechanics at the Technical University of Denmark, Lyngby.

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