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Autore	Carrera Erasmo
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Nota di contenuto	Introduction -- Stiffness matrix of a bar element -- Stiffness matrix of a beam bending around z axis -- Numerical remedies against shear locking -- Stiffness matrix of a beam bending around x axis -- Stiffness matrix of a beam subjected by a torsion -- Stiffness matrix of a beam under combined load -- Fundamental Nucleus using Unified Formulation -- Stiffness Matrix with Node-Dependent Kinematic -- Application to the analysis of real structures.
Sommario/riassunto	This book offers a comprehensive exploration of advanced finite element methods for modeling and analyzing beam-like structures. Moving beyond traditional 1D finite elements, it introduces the Carrera Unified Formulation (CUF), a versatile framework that unifies various structural behaviors under a single mathematical approach. The work addresses key challenges in finite element modeling, particularly shear locking, and provides practical solutions through techniques such as reduced and selectively reduced integration and mixed formulations. It also introduces Node-Dependent Kinematics (NDK), enabling localized refinement for high-accuracy results without excessive computational costs. Designed for students, researchers, and professionals, the book

includes MATLAB scripts to aid in deriving stiffness matrices for beam structures, bridging the gap between theoretical foundations and practical application. Clear, step-by-step instructions make complex concepts accessible, fostering both analytical understanding and hands-on skills. Whether you are an engineering student, a researcher in structural mechanics, or a practicing engineer, this book serves as an invaluable resource for mastering finite element techniques and applying CUF in real-world scenarios.