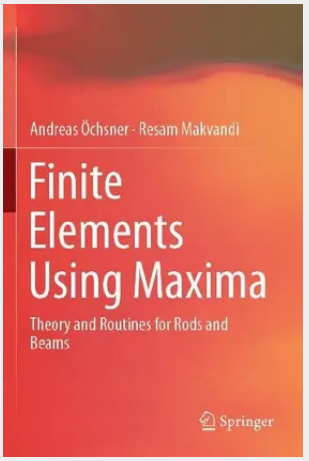
Öchsner / Makvandi

Finite Elements Using Maxima

Theory and Routines for Rods and Beams



This book provides a study aid on the finite element method. Based on the free computer algebra system “Maxima”, it presents routines to symbolically or numerically solve problems in the context of plane truss and frame structures. This allows readers to not only check classical “hand calculations” but also understand the computer implementation of the method. The mechanical theories focus on the classical one-dimensional structural elements, i.e. bars, Euler–Bernoulli and Timoshenko beams as well as their combination to generalized beam elements. Focusing on one-dimensional elements reduces the complexity of the mathematical framework and the resulting matrix equations can still be displayed with all components, and not only in a symbolic representation. The use of a computer algebra system and the incorporated functions, e.g. for equation solving, highlights the methodology of the finite element method rather than standard procedures.
The book is based on the Springer Brief “Finite Elements for Truss and Frame Structures” (978-3-319-94940-6) by the same authors.

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85,59 €
79,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9783030172015
Medium: Buch
ISBN: 978-3-030-17201-5
Verlag: Springer
Erscheinungstermin: 15.08.2020
Sprache(n): Englisch
Auflage: 1. Auflage 2019
Produktform: Kartoniert
Gewicht: 474 g
Seiten: 256
Format (B x H): 155 x 235 mm

Kundenservice Verlag Dr. Otto Schmidt KG
Neumannstraße 10, 40235 Düsseldorf | kundenservice@otto-schmidt.de | 0221-93738-997 (Inland)