

Contents

1	Introduction and Problem Formulation	1
1.1	Project Outline	2
1.2	Assessment Items and Marking Criteria	6
2	Review of Analytical Mechanics	9
2.1	Overview: One-Dimensional Structural Members	9
2.2	Partial Differential Equation-Based Approaches	9
2.2.1	Rods	9
2.2.2	Euler–Bernoulli Beams	19
2.2.3	Timoshenko Beams	32
2.3	Energy-Based Approaches	45
2.4	Extensometer Analysis	55
2.5	Supplementary Problems	64
3	Finite Element Method	67
3.1	General Idea of the Method	67
3.2	Rods and Trusses	68
3.2.1	Rod Elements	68
3.2.2	Truss Structures	86
3.3	Beams and Frames	105
3.3.1	Euler–Bernoulli Beam Elements	105
3.3.2	Timoshenko Beam Elements	123
3.3.3	Generalized Beam and Frame Elements	137
3.4	Extensometer Analysis	191
3.5	Supplementary Problems	201
4	Outlook: Two- and Three-Dimensional Elements	205
	Appendix A: Answers to Supplementary Problems	209
	References	219
	Index	221



<http://www.springer.com/978-3-319-69816-8>

A Project-Based Introduction to Computational Statics

Öchsner, A.

2018, XV, 222 p. 154 illus., Hardcover

ISBN: 978-3-319-69816-8