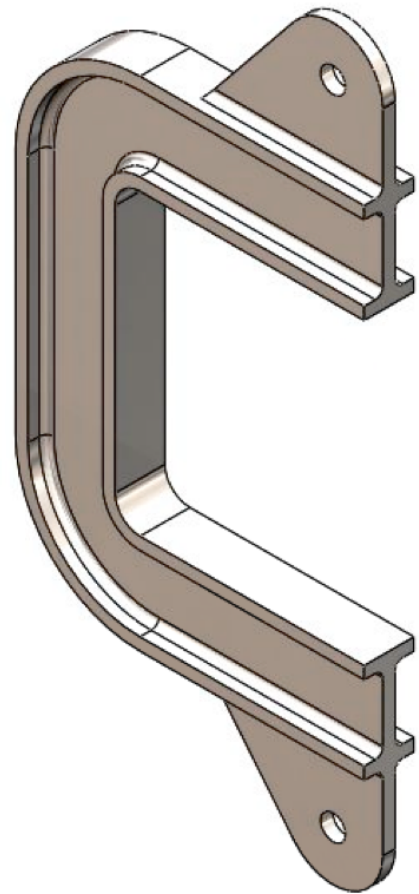
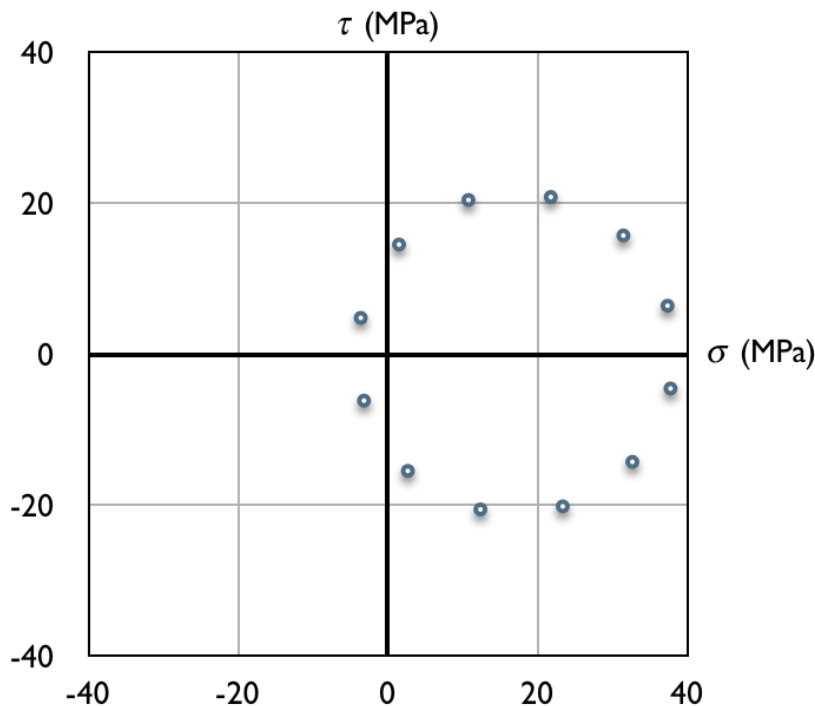


Includes
Video demonstrations
of the exercises in the book

Mechanics of Materials Labs

with SOLIDWORKS® Simulation 2015



Huei-Huang Lee



Visit the following websites to learn more about this book:



[amazon.com](https://www.amazon.com)

[Google books](https://books.google.com)

[BARNES & NOBLE](https://www.barnesandnoble.com)

Contents

Preface I

Chapter 1 Stresses 5

- 1.1 Stress Components 6
- 1.2 Nonuniform Stresses 25
- 1.3 Stresses in a C-Bar 36

Chapter 2 Displacements 51

- 2.1 Displacements in Cantilever Beam 52
- 2.2 Displacements in C-Bar 57

Chapter 3 Strains 60

- 3.1 Strains in Cantilever Beam 61
- 3.2 Strains in C-Bar 68

Chapter 4 Stress-Strain Relations 73

- 4.1 Poisson's Effects 74
- 4.2 Young's Modulus and Shear Modulus 80
- 4.3 Hooke's Law 87

Chapter 5 Axial Loading 90

- 5.1 Stress Concentration 91
- 5.2 Saint-Venant's Principle 99
- 5.3 Temperature Effects 109

Chapter 6 Torsion 114

- 6.1 Torsion in a Circular Shaft 115
- 6.2 Stresses in Cylindrical Coordinate System 123
- 6.3 Shaft and Disk 127

Chapter 7 Bending 136

- 7.1 Pure Bending 137
- 7.2 Elastoplastic Bending 147

Chapter 8 Shear Stresses in Beams 156

- 8.1 Shear Formula 157
- 8.2 Shear Stresses in a Box Beam 161
- 8.3 Shear Centers 167

Chapter 9 Strain Energy 172

- 9.1 Work, Strain Energy, and Strain Energy Density 173
- 9.2 Strain Energy in the C-Bar 179

Chapter 10 Failure Criteria 183

- 10.1 Mohr's Circle and Stress Extrema 184
- 10.2 Principal Stress, Stress Intensity, and von Mises Stress 196

Chapter 11 Trusses and Beams 204

- 11.1 Trusses 205
- 11.2 Beams 219

Chapter 12 Plane Problems 228

- 12.1 Plane Stress Problems 229
- 12.2 Plane Strain Problems 236
- 12.3 Axisymmetric Problems 246

Chapter 13 Plates and Shells 251

- 13.1 Channel Beam 252
- 13.2 Storage Tank 255

Chapter 14 Buckling 260

- 14.1 Buckling of a Truss Member 261
- 14.2 Buckling of an Aluminum Beverage Can 267

Index 273