

Contents

<i>Preface</i>	<i>ix</i>
<i>Acknowledgments</i>	<i>xi</i>
Chapter I Tensor Algebra	
1. Points. Vectors. Tensors	1
2. Spectral Theorem. Cayley–Hamilton Theorem. Polar Decomposition Theorem	11
Selected References	17
Chapter II Tensor Analysis	
3. Differentiation	19
4. Gradient. Divergence. Curl	29
5. The Divergence Theorem. Stokes’ Theorem	37
Selected References	40
Chapter III Kinematics	
6. Bodies. Deformations. Strain	41
7. Small Deformations	54

8.	Motions	58
9.	Types of Motions. Spin. Rate of Stretching	67
10.	Transport Theorems. Volume. Isochoric Motions	77
11.	Spin. Circulation. Vorticity	80
	Selected References	85
Chapter IV Mass. Momentum		
12.	Conservation of Mass	87
13.	Linear and Angular Momentum. Center of Mass	92
	Selected Reference	95
Chapter V Force		
14.	Force. Stress. Balance of Momentum	97
15.	Consequences of Momentum Balance	108
	Selected References	113
Chapter VI Constitutive Assumptions. Inviscid Fluids		
16.	Constitutive Assumptions	115
17.	Ideal Fluids	119
18.	Steady, Plane, Irrotational Flow of an Ideal Fluid	122
19.	Elastic Fluids	130
	Selected References	137
Chapter VII Change in Observer. Invariance of Material Response		
20.	Change in Observer	139
21.	Invariance under a Change in Observer	143
	Selected References	145
Chapter VIII Newtonian Fluids. The Navier–Stokes Equations		
22.	Newtonian Fluids	147
23.	Some Simple Solutions for Plane Steady Flow	156
24.	Uniqueness and Stability	159
	Selected References	164

Chapter IX Finite Elasticity

25. Elastic Bodies	165
26. Simple Shear of a Homogeneous and Isotropic Elastic Body	175
27. The Piola–Kirchhoff Stress	178
28. Hyperelastic Bodies	184
29. The Elasticity Tensor	194
Selected References	198

Chapter X Linear Elasticity

30. Derivation of the Linear Theory	199
31. Some Simple Solutions	201
32. Linear Elastostatics	205
33. Bending and Torsion	214
34. Linear Elastodynamics	220
35. Progressive Waves	223
Selected References	226

Appendix

36. The Exponential Function	227
37. Isotropic Functions	229
38. General Scheme of Notation	239

References	243
-------------------	-----

Hints for Selected Exercises	247
-------------------------------------	-----

<i>Index</i>	261
--------------	-----