

Contents

Chapter 1 Introduction	1
Chapter 2 Basic Equations	9
2.1 Formulation of Initial-Boundary Value Problems	9
2.2 The Classical and Weak Solutions	14
2.3 The Homogeneous Isotropic Body. Plane Elasticity.	16
2.4 Definiteness Properties of the Elasticities	18
Chapter 3 Early Work	23
Chapter 4 Modern Uniqueness Theorems in Three-Dimensional Elastostatics	32
4.1 The Displacement Boundary Value Problem for Bounded Regions	32
4.1.1 General Anisotropy	32
4.1.2 A Homogeneous Anisotropic Material	36
4.1.3 A Homogeneous Isotropic Material	38
4.1.4 The Implication of Strong Ellipticity for Uniqueness	39
4.1.5 The Non-Homogeneous Isotropic Material with no Definiteness Assumptions on the Elasticities	40
4.1.6 The Displacement Boundary Value Problem for a Homogeneous Isotropic Sphere	41
4.1.7 Fichera's Maximum Principle	42
4.2 Exterior Domains	43
4.3 The Traction Boundary Value Problem	44
4.3.1 General Anisotropy	45
4.3.2 A Homogeneous Isotropic Material	45
4.3.3 The Traction Boundary Value Problem for a Homogeneous Isotropic Elastic Sphere	49

4.3.4 Necessary Conditions for Uniqueness in the Traction Boundary Value Problem for Three-Dimensional Homogeneous Isotropic Elastic Bodies	50
4.4 Mixed Boundary Value Problems	51
4.4.1 General Anisotropy	52
4.4.2 A Homogeneous Isotropic Material	53
Chapter 5 Uniqueness Theorems in Homogeneous Isotropic Two-Dimensional Elastostatics	61
5.1 Kirchhoff's Theorem in Two-Dimensions. The Displacement and Traction Boundary Value Problems.	62
5.2 Uniqueness in Plane Problems with Special Geometries	65
Appendix: Uniqueness of Three-Dimensional Axisymmetric Solutions	69
Chapter 6 Problems in the Whole- and Half-Space	70
6.1 Specification of the Various Boundary Value Problems. Continuity onto the Boundary and in the Neighbourhood of Infinity	72
6.2 Uniqueness of Problems (a)—(d). Corollaries for the Space E_N	76
6.3 Uniqueness for the Mixed-Mixed Problem of Type (e)	80
6.3.1 A Complete Representation of the Biharmonic Displacement in a Homogeneous Isotropic Body Occupying the Half-Space.	80
6.3.2 Uniqueness in the Mixed-Mixed Problem (e)	82
Chapter 7 Miscellaneous Boundary Value Problems	88
7.1 Problems for a Sphere	88
7.2 The Cauchy Problem for Isotropic Elastostatics	90
7.3 The Signorini Problem. Other Problems with Ambiguous Conditions	91
Chapter 8 Uniqueness Theorems in Elastodynamics. Relations with Existence, Stability, and Boundedness of Solutions	98
8.1 The Initial Displacement and Mixed-Boundary Value Problems. Energy Arguments	99

8.2 The Initial-Displacement Boundary Value Problem. Analyticity Arguments	100
8.3 The Initial-Mixed Boundary Value Problem for Bounded Regions. Further Arguments	102
8.4 Summary of Existing Results in the Uniqueness of Elastodynamic Solutions	106
8.5 Non-Standard Problems, including those with Am- biguous Conditions	107
8.6 Stability, Boundedness, Existence and Uniqueness .	112
References	118
Subject Index	127