

Contents

Preface

Chapter 1. The Laplace Equation

1.1. Notation and prerequisites	1
1.2. The fundamental boundary value problems	7
1.3. Green's formulae	9
1.4. Uniqueness theorems	12
1.5. The harmonic potentials	14
1.6. Properties of the boundary operators	17
1.7. The classical indirect method	24
1.8. The alternative indirect method	29
1.9. The modified indirect method	31
1.10. The refined indirect method	37
1.11. The direct method	40
1.12. The substitute direct method	48

Chapter 2. Plane Strain

2.1. Notation and prerequisites	54
2.2. The fundamental boundary value problems	58
2.3. The Betti and Somigliana formulae	61
2.4. Uniqueness theorems	66
2.5. The elastic potentials	67
2.6. Properties of the boundary operators	71
2.7. The classical indirect method	85
2.8. The alternative indirect method	92
2.9. The modified indirect method	95
2.10. The refined indirect method	102
2.11. The direct method	105
2.12. The substitute direct method	114

Chapter 3. Bending of Elastic Plates

3.1. Notation and prerequisites	121
3.2. The fundamental boundary value problems	126

3.3. The Betti and Somigliana formulae	129
3.4. Uniqueness theorems	135
3.5. The plate potentials	136
3.6. Properties of the boundary operators	139
3.7. Boundary integral equation methods	143
Chapter 4. Which Method?	145
4.1. Notation and prerequisites	145
4.2. Connections between the indirect methods	146
4.3. Connections between the direct and indirect methods	150
4.4. Overall view and conclusions	152
Appendix	154
A1. Geometry of the boundary curve	154
A2. Properties of the boundary layer	157
A3. Integrals with singular kernels	164
A4. Potential-type functions	176
A5. Other potential-type functions	182
A6. Complex singular kernels	190
A7. Singular integral equations	195
References	200