

Contents

Introduction	vii
CHAPTER I. Physical Prerequisites	1
§1. Interfaces between two media	1
§2. The principle of economy in Nature	6
CHAPTER 2. Classical Minimal Surfaces in \mathbb{R}^3	21
§1. Catenoids	21
§2. The helicoid	32
§3. The minimal surface equation. Bernstein's problem. The Scherk surface	39
§4. Periodic minimal surfaces	45
§5. Complete minimal surfaces	49
CHAPTER 3. General Properties of Minimal Surfaces in \mathbb{R}^3	53
§1. Isothermal coordinates	53
§2. Harmonicity and conformality	58
§3. The Gaussian mapping and the Weierstrass representation	64
§4. The global Weierstrass representation	74
§5. Total curvature and complete minimal surfaces	81
§6. The geometry of complete minimal surfaces of finite total curvature	90
§7. Indices of two-dimensional minimal surfaces in \mathbb{R}^3	102
APPENDIX. Steiner Problem for Convex Boundaries	115
Bibliography	135
Subject Index	141