

CONTENTS

List of Figures	xi
Preface	xv
Acknowledgments	xxi
Chapter 1	
Introduction	1
1.1 Development of the Wake Behind Finite Bodies	1
1.2 Basic Equations	3
Chapter 2	
Flow Downstream of a Trailing Edge	7
2.1 Flat Plate — Two-Dimensional Flow	7
2.2 Very Slender Cylinder — Axisymmetric Flow	14
Chapter 3	
Free Shear Layer and Near-Wake Analyses: Chapman Model	23
3.1 Chapman Model for Laminar Mixing	23
3.2 Some Aspects of the Supersonic, Inviscid Base-Flow Problem	33
3.3 Chapman Isentropic Recompression Model	36
3.4 Free Shear Layers with Finite Initial Thickness	40
3.5 Concluding Remarks	67
Chapter 4	
Wakelike Similarity Solutions	69
4.1 Two-Dimensional Wakes	69
4.2 Axisymmetric Wakes	76

Chapter 5

Near Wake 81

The Crocco and Lees Model

5.1 Momentum-Integral Solution 82

5.2 Finite-Difference Solution 125

5.3 Further Results 138

5.4 Exact Treatment of the Throat 141

Other Methods and Models

5.5 Holt-Nielsen Method 154

5.6 Stewartson Model 155

Chapter 6

Other Approaches to the Near-Wake Problem 157

6.1 Patched Composite Solutions of the Slender-Body Hypersonic
Near Wake 158

6.2 Batchelor's Wake Model 168

6.3 Series Expansion 181

6.4 Numerical Solutions for Entire Near-Wake Region 182

Chapter 7

Separation and Expansion of a Supersonic Boundary Layer 185

7.1 Rapid Expansion of a Supersonic Boundary Layer 185

7.2 Application to the Base-Flow Problem 193

7.3 The Flow Upstream of the Corner 199

7.4 Viscous Effects on the Expansion and the Lip Shock 202

Chapter 8

Near-Wake, Slow-Flow Solutions 211

8.1 The Stokes and Oseen Approximations 211

8.2 Stokes Linearization of the Vorticity Equation 229

Chapter 9

The Near-Wake Rear Stagnation Point 233

9.1 Local Taylor-Series Solution of the Navier-Stokes Equations 233

Chapter 10

Far Wake 237

10.1 Two-Dimensional Asymptotic Solution 237

10.2 Axisymmetric Flow Asymptotic Solution 248

10.3 Linearized Solutions 254

10.4 Integral-Method Solution 264

10.5 Numerical Solutions 267

References 279

Subject Index 291