Chapter 4 Laminar Boundary Layers

1. Historical Background and Boundary Layer Concepts
2. Boundary Layer Theory
   Part 1
   a. Integral Methods: Flat Plate
   b. Boundary Layer Equations
   Part 2
   c. Similarity Solutions
      i. Flat Plate: Blasius Solution
      ii. Falkner-Skan Wedge Flows
      iii. Flat with Wall Suction or Blowing
   Part 3
   d. Momentum Integral Methods
   Part 4
   e. Boundary Layer Separation
      i. Transition, Pressure Gradient, and Boundary-Layer Separation
      ii. 3D Separation
         1. Definitions and Examples Steady and Unsteady Separation.
         2. 3D Separation Patterns
      iii. Flow Past Cylinders and Spheres
      iv. Sports Ball Dynamics
      v. Unsteady Separation
3. Free Shear Flows
   a. Mixing Layers
   b. Jets

i. 2D
ii. 2D Wall Jet
iii. Axisymmetric (Round) Jet

c. Wakes
i. 2D
1. Flat Plate
2. Non-Lifting Body
ii. Axisymmetric (Round) Wake
iii. Simplified Betz Method
1. Clark Y Reference Data

4. Additional Topics
a. Inlet Duct Flow
b. Rotationally Symmetrical Boundary Layers
c. Axisymmetric Boundary Layers
d. 3D Boundary Layers
e. Asymptotic Expansions
f. Unsteady Boundary Layers

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