Transonic aerodynamics: problems in asymptotic theory

Abstrak

Transonic aerodynamics, the study of the aerodynamics of flight at speeds near the speed of sound, warrants a great deal of attention from industry and science. As an airplane approaches Mach one, the drag steeply increases. This has prompted scientists to study transonic range of flight and to design reduced wing drag. Asymptotic theory of transonic aerodynamics forms the basis for this monograph. The equations governing transonic flow are inherently nonlinear and must ultimately be solved numerically. Asymptotic analysis simplifies and enriches both the theory and the computations of these flows. It reduces the number of parameters involved, can simplify the geometry, and clarifies near and fluid conditions.
Transonic Aerodynamics: Problems in Asymptotic Theory offers exciting results, perspectives, and case studies for the treatment of problems arising in transonic aerodynamics. New advances including triple deck theory, analysis of stagnation at the nose of a body, transonic choked flow, and the transonic area rule are presented.
Interest in analyzing the transonic range of flight, its stability properties, and especially the question of designing reduced drag (shockless or weak shock) airfoils keeps growing. Present day commercial aircraft cruise in the transonic range. Mechanical and aeronautical engineers interested in compressible fluid flows, design of optimal wings, and an understanding of transonic flow held about wings and airfoils will find the book invaluable.
This book is understandable to those with a knowledge of continuum mechanics (fluids) and asymptotic methods. It is appropriate for graduate courses in aerodynamics and mathematical methods.