

In the Name of GOD

Supersonic Aerodynamics Syllabus

Instructor: Ehsan Roohi

Textbooks:

- Lipmann, H.W., Roshko, A., *Elements of Gas Dynamics*, John Wiley & Sons Inc. (1957), Dover Publications (2002).
- Anderson, J.D., “*Modern Compressible Flow with Historical Perspective*, Mc Graw Hill, 2nd edition, 2003.
- Ashley, H., Lanhal, M., *Aerodynamics of Wings and Bodies*, 1965.

Contents:

Chapter 1: Review of Compressible flow

- 1- Integral equations for quasi one dimensional flows, isentropic relations
- 2- One dimensional flows, normal shock relations
- 3- Area velocity relation, flow inside nozzles and diffusers
- 4- Oblique shock relations, shock polar diagram
- 5- Wave interactions
- 6- Thin supersonic airfoil theory
- 7- Small perturbation theory for lift and drag coefficients

Chapter 2: Axisymmetric supersonic flow

- 1- Basic concept and equations
- 2- Perturbation method
- 3- Flow past a cone
- 4- Method of characteristics
- 5- Slender body theory
- 6- Cross flow solution
- 7- Van Dyke method for axially symmetric bodies at angle of attack
- 8- Interference effects
- 9- Empirical methods
- 10- Applications of aerodynamics

Chapter 3: Three dimensional thin wings in steady supersonic flow

- 1- Introduction
- 2- Non-lifting wings
- 3- Lifting wings of simple platforms
- 4- Sweptback wings

- 5- Method of supersonic source and doublet distributions
- 6- Method of conical fields

Score Policy:

HW (6-8 sets): 25%

Midterm: 35%

Final: 40%