

AE612A – Aerodynamics II

Instructor: Mohammed Ibrahim. S

Department of Aerospace Engineering

Indian Institute of Technology – Kanpur

Ph: +91 512 259 6345, Email: ibrahim@iitk.ac.in



Course Contents:

Introduction to Compressible Flow: Definition of compressibility, limiting condition for compressibility, flow regimes, A brief review of thermodynamics and conservation equations; continuity, momentum and energy.

One-Dimensional Flow: isentropic flows, speed of sound, normal shock waves, flow with friction (Fanno flow) & heat addition (Rayleigh flow).

Two-Dimensional Flow: oblique shock and expansion waves, a few applications.

Quasi-one-Dimensional Flow: Area-Velocity relation, nozzles and diffusers.

Potential Flows: Potential equation, Linearization, similarity rule, Method of Characteristics

Unsteady Wave motion: Incident & reflected normal shock, shock tube (Reimann Problem)

Hypersonic Flow: A brief introduction.

Recommended Text/Reference books:

- Elements of Gas Dynamics, Liepmann & Roshko, Dover publications, 2002.
- Modern Compressible Flow, J. D. Anderson, McGraw Hill publications, 1990.
- Gas Dynamics, E. Radhakrishnan, PHI publications, 2017.
- Gas Dynamics, John & Keith, Prentice Hall publication, 2006.
- Fundamentals of Gas Dynamics, Robert & Oscar, John Wiley & sons, INC, 2002.

Grading Policy:

- Quiz (2) – 10% each
- Mid-sem – 25%
- End-sem – 45%
- Assignment – 5%
- Attendance – 5%

Others:

- Please try to attend all lectures. You are responsible for the course contents covered and any announcements made in the class.
- You are encouraged to interrupt me during lectures if in case you have any queries or comments. I would prefer a more interactive lecture where I can also learn from you

as well. Outside the class you can contact me during office hours or e-mail me your doubt and comments.

- Please try to submit assignments/homework problem on time. Delayed submission shall not be assigned any credit.
- Sickness or official travel may force me to miss a scheduled class once in a while, in which case make up class will be scheduled as per the convenience of the class. Your cooperation will be highly appreciated.
- Wish you all the best of learning!!!