AE 6060 AEROACOUSTICS

Catalog Data: AE 6060-Aeroacoustics 3-0-3.
Lighthill's theory of aerodynamic noise and extensions, flow/acoustic interactions, feedback phenomenon, supersonic jet noise, aeroacoustics of ducts, propeller noise, helicopter noise, sonic boom.

Coordinator: Dr. Krishan K. Ahuja, Regents Researcher and Professor

Prerequisites: Exposure to Navier Stokes equations and consent of instructor.

Textbook: At the level of

- Dowling, A. P. and Ffowcs Williams', "Sound and Sources of Sound," Ellis Horwood Publishers, 1983.
- Marvin E. Goldstein," Aeroacoustics," McGraw-Hill, 1976.

Learning Objectives: To introduce engineering graduate students to the theoretical methods used for modeling noise related to flow phenomenon and to advanced experimental methods used for identifying various sources of noise.

Lecture Topics: (One week per topic, roughly)

1. The Wave Equation and Acoustics Terminology
2. Sources of Sound Relevant to Aerodynamic Noise
3. General Aspects of Aerodynamic Noise Theory
4. Parametric Dependence of Aerodynamic Noise
5. Jet Mixing or Exhaust Noise
6. Instability Waves and Flow/Acoustic Interactions
7. Self-Excited Aerodynamic Noise/Resonance (Cavity Noise, Jet/Collector Interactions)
8. Shock-Associated Noise of Supersonic Jets (Screech, Broadband Shock- Associated Noise)
9. Boundary Layer Noise/Automobile Wind Noise
10. Sonic Boom
11. Propeller Noise
12. Helicopter Noise
13. Waves in Rectangular Ducts
14. Waves in Circular Ducts
15. Advanced Signal Processing Methods for Source Identification

Assignments: Each student will be asked to prepare a review article on a flow-noise related topic of his or her choice. The review article will be similar in format to an AIAA conference paper. Depending upon the number of students in the class and the topic, the students will be allowed to work in teams. Each team will be expected to make a formal presentation of its review article to the whole class during the last week of the class.