



SOUND AND STRUCTURAL VIBRATION

PROF. VENKATA R. SONTI

Department of Mechanical Engineering
IISc Bangalore

TYPE OF COURSE : New | Elective | PG

COURSE DURATION : 12 Weeks (24 Jan' 22 - 15 Apr' 22)

EXAM DATE : April 24, 2022

PRE-REQUISITES : A fundamental course in acoustics and a course in vibrations of continuous systems are definite pre-requisites

INTENDED AUDIENCE : PhD students only

INDUSTRIES APPLICABLE TO : Automobile, refrigeration and air-conditioning, all types of manufacturing industries, ship and submarine building companies, aircraft industry, washing machine industry.

COURSE OUTLINE :

The course teaches how vibrating structures radiate sound. The student intending to take the course must have a good background in vibrations of continuous systems (like plates and shells) and acoustics. The course involves mathematical derivations and physical explanations. The material and homeworks will involve solving problems from current journal papers.

ABOUT INSTRUCTOR :

Prof. Venkata Sonti has a Ph.D. from Purdue University (Herrick labs., 1994) with a specialization in acoustics and vibrations. He has been a faculty at the Indian Institute of Science since 1999 in the Dept. of Mechanical Engineering. He has been conducting research and teaching courses in vibrations, acoustics, linear and nonlinear sound-structure interaction for the last 22 years.

COURSE PLAN :

Week 1: Introduction to Waves

Week 2: The coupled roots and the physics

Week 3: The coupled sound and vibration field

Week 4: The 2-D structural-acoustic waveguide

Week 5: Closed form derivations of coupled waves

Week 6: Vibrating rectangular plate backed by a cavity

Week 7: Sound radiation from a rectangular plate set in a baffle.

Week 8: Sound radiation from a baffled plate contd.

Week 9: Radiation resistance defined by Maidanik

Week 10: Transmission of sound through vibrating plates

Week 11: Structural acoustics in cylindrical geometry

Week 12: Fluid loading phenomenon in structural acoustics