VIBRATIONS OF PLATES AND SHELLS

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PRE-REQUISITES : Bachelors in engineering or science. A basic course in lumped vibrations is required.

INTENDED AUDIENCE : Masters and PhD students

INDUSTRY SUPPORT : Aircraft industry, automobile industry, home appliances like washing machines.

COURSE OUTLINE :

The course presents theory of vibrations of continuous systems such as rods, plates and shells. Many engineering applications like automobiles, aircraft structures, ship hulls, submarine hulls, pipes carrying water and all such applications where high speed moving parts are used, require knowledge of this topic as high vibrations will be a problem.

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: Differential Geometry
Week 2: Differential length and strain
Week 3: Hamilton's Law for vibrating shells
Week 4: The general equations of motion
Week 5: Equations of motion for a vibrating rectangular plate
Week 6: Modes and natural frequencies of vibrating structures and their animations
Week 7: Modes and natural frequencies of vibrating cylindrical shells
Week 8: The Rayleigh Ritz method for approximating natural frequencies and modeshapes
Week 9: The Rayleigh Ritz method applied to plates and shells
Week 10: Forced response of plates and shells using modal summation
Week 11: Forced response of a cylindrical shell
Week 12: Vibrations of connected structures: The Receptance method