Vibration of Structures - Video course

COURSE OUTLINE

Vibrations of strings and bars: equations of motion, modal analysis, approximate methods, initial value problem, forced vibrations, damped vibrations

Wave propagation and scattering: d'Alembert solution, harmonic waves, scattering, applications of wave solution

Vibrations of beams: equation of motion, modal analysis, approximate methods, initial http://nptel.iitm.ac.in value problem, forced vibrations, special problems, wave propagation

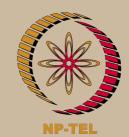
Vibrations of membranes: equations of motion, modal analysis, approximate methods Vibrations of plates: equations of motion, modal analysis, approximate methods

Session Plan

Module No.	Торіс	No of Sessions
I	Vibrations of Strings and Bars	16
II	Wave Propagation and Scattering	6
III	Vibrations of Beams	10
IV	Vibrations of Membranes	4
v	Vibrations of Plates	4
	TOTAL HOURS	40

Lecture Plan

- 1. Transverse Vibrations of Strings I
- 2. Transverse Vibrations of Strings II
- 3. Axial and Torsional Vibrations of Bars
- 4. Variational Formulation I
- 5. Variational Formulation II
- 6. Modal Analysis I
- 7. Modal Analysis II
- 8. Properties of Eigenvalue Problem
- 9. Modal Analysis: Approximate Methods I
- 10. Modal Analysis: Approximate Methods II
- 11. Initial Value Problem
- 12. Forced Vibration Analysis I
- 13. Forced Vibration Analysis II
- 14. Forced Vibration Analysis III
- 15. Damping in Structures
- 16. Axially Translating Strings
- 17. d'Alembert's Solution I
- 18. d'Alembert's Solution II





Mechanical Engineering

Pre-requisites:

Engineering Mathematics, Mechanics, Dynamics, Vibrations of discrete systems

Hyperlinks:

NPTEL web course on Vibrations of Structures

Coordinators:

Prof. A. Dasgupta Department of Mechanical EngineeringIIT Kharagpur

- 19. Harmonic Waves and Energetics of Wave Motion
- 20. Scattering of Waves
- 21. Applications of Wave Solution I
- 22. Applications of Wave Solution II
- 23. Beam Models I
- 24. Beam Models II
- 25. Modal Analysis of Beams
- 26. Application of Modal Solution
- 27. Approximate Methods
- 28. Topics in Beam Vibrations I
- 29. Topics in Beam Vibrations II
- 30. Wave Propagation in Beams
- 31. Dynamics of Curved Beams
- 32. Vibrations of Rings and Arches
- 33. Dynamics of Membranes
- 34. Vibrations of Rectangular Membrane
- 35. Vibrations of Circular Membrane
- 36. Special Problems in Membrane Vibrations
- 37. Dynamics of Plates
- 38. Vibrations of Rectangular Plates
- 39. Vibrations of Circular Plates
- 40. Special Problems in Plate Vibrations

References:

- 1. Peter Hagedorn and Anirvan DasGupta: Vibrations and Waves in Continuous Mechanical Systems, Wiley, 2007
- 2. Leonard Meirovitch: Analytical Methods in Vibrations, The Macmillan Co., 1967
- 3. S.S. Rao: Vibration of Continuous Systems, Wiley, 2007

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