The Hong Kong University of Science and Technology

Introduction to Structural Dynamics

CIVL 4330

Pre-requisites: Mechanics of materials, matrix algebra, and differential equations

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Course Description

Upon successful completion of this course, students should be able to

1.   understand basic concepts of Newton's laws of motion

2.   determine equations of motion (EOM) and structural response of single-degree-of-freedom (SDOF) structural systems to various types of external excitation such as transient, harmonic and periodic driving forces

3.   determine design parameters of SDOF systems such as damping ratio, dynamic magnification factor, and transmissibility during ground motion

4.   assemble mass and stiffness matrices for multiple-degree-of-freedom (MDOF) systems; obtain frequencies of vibration and mode shapes

5.   determine structural response of MDOF systems

6.   solve vibration problems involving basic continuous systems such as beams and rods

7.   understand Hamilton's principle and Lagrange's equations, and assemble stiffness matrices and EOM efficiently from related energy approach

8.   analyze and design tuned-mass-dampers (TMD)

9.   understand and apply earthquake response spectra to analyze simple structures subjected to earthquakes

Assessments:

Assessment Task	Contribution to Overall Course grade (%)
Two pre-announced quizzes	2×10% = 20%
Mid-Term	30%
Final examination	50%

Required Texts and Materials

Lecture notes