

Mechanical vibrations

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Single degree of freedom systems (cap. 3).

Free vibration, forced vibration, frequency response function, harmonic excitation, periodic excitation.

Multi degrees of freedom systems (cap. 4,5).

Free vibration of 2 and N degrees of freedom system. Mass, stiffness, damping matrices. Rigid body modes. Orthogonality of eigenvectors. Modal decoupling. Forced vibration, frequency response function

Continuum systems(6,7).

Free vibration of beams (flexural and axial) .

Numerical methods in dynamic analysis (appunti web, cap 8).

- Rayleigh-Ritz method.

-Finite element method.

-FEM Software: MSC. Nastran and MSC. Patran. Exercises in lab..

Frequency analysis of signal (cap. 9).

Fourier theory, signal types.

Measuring vibration (cap. 9,10).

Accelerometer, experimental modal analysis: theory and practice.

Rotordynamics (cap. 13).

Books

- Meneghetti, Maggiore, Funaioli, Lezioni di meccanica applicata alle macchine. Vol. 3: Dinamica e vibrazioni delle macchine, Pàtron, 2010.
- Rao, *Mechanical Vibrations*, 3rd ed., New York, Addison-Wesley, 1995.
- Thomson W., *Theory of Vibration with Applications*, 4th edition, New York, Chapman & Hall, 1993.