Auskunft:

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Machine Dynamics and Systems Dynamics

Abstract:

Learning objectives: Prediction and analysis of the evolution of the system's state, especially in machine and structural dynamics with the motion in terms of displacements, velocities and accelerations as well as dynamic internal forces and moments in machines and structures. The student will also get basic understanding of important vibration phenomena (forced, parametric and self-excited vibrations) and should be able to analyse single and multi degree of freedom systems.

Contents:

- Kinematics of Particles and Rigid Bodies (Rotation Matrices, Euler and Cardan angles, Holonomic and Non-holonomic Constraints)
- Kinetics of Point Masses and Rigid Bodies (Momentum and Angular Momentum, Newton's and Euler's Law, Work-Energy Principles, Lagrange's Equations of Motion, State Space Representation)
- Overview on Vibration Phenomena
- Vibrations of Linear Systems with a Single Degree of Freedom (Equation of Motion, Free Vibrations, Damping, Forced Vibrations from Harmonic and General Periodic Excitation, Excitation by Impacts, Excitation by Forces with Arbitrary Time Functions)
- Vibrations of Systems with Multi Degrees of Freedom (Equations of Motion, Free undamped Vibrations, Eigenvalue Problem, Natural Frequencies, Mode Shapes, Modal Matrix, Orthogonality of Modes, Forced Vibrations)
- Mechatronic Systems and Smart Structures