2306	Dynamics of Rotating Machines

Dynamics of flexible bodies in rotation, gyroscopic phenomena. Bending and torsional vibrations of rotors. Linear harmonic analysis (eigenvalues, eigenmodes in rotating machines, critical speeds), Campbell diagrams, application of Finite Element Method in rotors, dynamic analysis of multiple body systems with local nonlinearities, application of Model Order Reduction techniques, stability criteria in multiple DOF systems, damping models, characteristics of trajectories and response time series (periodicity, quasi-periodicity, chaos) in rotating machines, tribology in sliding bearings (Reynolds equation), design of sliding bearings and gas foil bearings, squeeze film dampers, base excitation in machines, parametric excitation (anisotropic rotors in generators), self- excited vibrations from fluid and gas flow (oil whirl/whip, Thomas/Alford forces) and dynamic stability. Standards and templates in dynamic analysis of turbomachines. Simulation of rotating machines. Projects: Basic rotor dynamic calculations for turbomachinery design, e.g. turbine-generator for power generation, turbopump for rocket propulsion, turbochargers in internal combustion engines, gear boxes, power transmission layouts.