SG2150 Rigid Body Dynamic 7.0 credits

Stelkroppsdynamik

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for SG2150 valid from Autumn 2007

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After the course the students should be able to:

Find and combine moments of inertia and construct inertia tensors.

Use the Newton-Euler vector formalism to solve rigid body problems.

Calculate the generalized forces for holonomic few-body systems.

Calculate Lagrangian functions for holonomic few-body systems, by hand and by using computer algebra.

Derive Lagrangian equations of motion for holonomic few-body systems, by means of computer algebra when necessary.

Solve these equations, numerically as well as analytically, for a number of standard problem types, including impact problems and coupled oscillation problems.

Course contents

Rigid body kinematics. General dynamic equations for a system of particles. General 3D motion of a rigid body. Analytical mechanics with application to systems of particles, rigid bodies and systems of rigid bodies. In particular Lagrangian methods including generalized coordinates, velocities, momenta and forces, cyclic coordinates and conservation laws.

Applications include dynamics of planar multibody mechanisms, gyroscopic effects in 3D-motion, impact problems, linearization and coupled oscillations, normal modes. Problems are treated with modern computational methods including symbolical (Maple) and numerical treatment.

Specific prerequisites

SG1130, and SG1140 or SG1113

Course literature

Recommended: H. Baruh ”Analytical Dynamics” Mc Graw-Hill, 1999.
Lecture notes by Hanno Essén cover most of the material.

Examination

- INL1 - Assignments, 2.0 credits, grading scale: P, F
- TEN1 - Examination, 5.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH’s coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Other requirements for final grade

Home assignments and written exam.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.