INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

Dynamics

Introducing

Description

- Analyze the spatial mass distribution of a rigid body (inertia matrix, center of mass).

Newton's first law of motion for a system of rigid bodies:
- Determine the linear and angular momentum and their time derivatives using screw theory
- Determine a solving strategy to apply the first law (systems of interest, equations to be used)
- Determine mechanical actions or differential equations of motion by applying the first law

Work-energy theorem for a system of rigid bodies:
- Calculate the kinetic energy of a body in motion (rotation, translation, helical motion)
- Determine the power of external forces and contact forces
- Derive an equation of motion or determine a force using the work-energy theorem (WET)

Objectives

Rigid body dynamics
At the end of this course, you will be able to:
- Determine the motion of a mechanism over time given the forces acting on it,
- Determine the mechanical actions in the joints or actuators required to produce the desired motion.
Newton's first law of motion and the work-energy theorem (WET) will be used

Necessary prerequisites

Solid mechanics I course:
- Force and moment calculation
- Common forces modeling
- Calculation of velocity and acceleration
- Screw theory: modeling forces as wrenches and velocity fields as twists
- Solving a statics problem

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

Toulouse