Fracture mechanics

Remarque
Pas donné en 2019-20. Course reserved for Mechanical Engineering students.

Summary
The student acquires the notions of damage and fracture in different materials; the basis of energy release rate and stress intensity factor; fracture criteria; weight functions for crack opening displacements; J integral and non-linear fracture; fatigue crack propagation.

Content
The course presents the modern theory of fracture mechanics, stress singularities, the various fracture modes, stress intensity factors and energy release rates in linear and no-linear materials. The main chapters cover the following topics: review of the classical theories of strength and damage, singular problems in linear elasticity theory and fracture parameters, weight functions, fracture in elastoplastic materials, applications to composite materials, experimental methods in fracture mechanics.

Keywords
Damage, Fracture

Learning Prerequisites
Required courses
Solid mechanics

Recommended courses

Important concepts to start the course
Apply the concepts of rigid and deformable body mechanics and of continuum mechanics to model and solve analytically problems of statics, structural stress analysis or simple mechanisms.

Learning Outcomes
By the end of the course, the student must be able to:
- Apply the principles of damage, fatigue and fracture mechanics to predict the size and localisation of critical defects and the number of cycles to failure of a real structure under complex loading conditions, S8
- Apply the principles of damage, fatigue and fracture mechanics to analyse and design real structures, S8

Transversal skills
• Assess one's own level of skill acquisition, and plan their on-going learning goals.
• Write a scientific or technical report.

Teaching methods
Ex cathedra lectures, exercises sessions and TP

Assessment methods
Oral examination 80%, exercises 20%

Supervision
Office hours No
Assistants Yes
Forum No

Resources
Bibliography
Course material