CIVIL-704 Fracture Mechanics and Fatigue of Structures
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Language English
Credits 2
Session Oral
Workload 60h
Hours 28
Lecture 20
Practical work 8
Number of positions

Frequency
Every 2 years

Remarque
Every two years/ Next time: oct/nov 2019 (Block course). Minimum 5 inscrits

Summary
Determination of stress intensity factors and application of fracture mechanics to structures made of different materials. Ability to apply fracture mechanics to predict brittle fracture + compute fatigue life of structural elements. Understanding of the influencing parameters + methods to determine them

Content
Fracture micromechanisms in steels, Griffith and Irwin theories, concept of stress intensity factor, fracture toughness and its determination
- Plated steel structures: Fatigue strength of welded steel elements, size effect, residual stresses influence, application of fracture mechanics to fatigue
- Tubular steel structures: Hot spot stress method for fatigue design, welded vs cast steel joints
- Structural glass: Subcritical crack growth, predicting time to failure
- Reinforced concrete structures: Fracture mechanics, fracture of concrete, size effect, brittle failure, fatigue of reinforced concrete elements, evaluation of fatigue safety of bridge decks, fracture due to dynamic effects.

Keywords
Fracture mechanics, fatigue, steel structures, concrete structures, structural safety

Learning Prerequisites
Required courses
Mechanics of structures and materials

Teaching methods
Ex-cathedra lectures and exercices

Assessment methods
Oral exam