

CIVIL-704

Fracture Mechanics and Fatigue of Structures

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Cursus	Sem.	Type
Civil & Environmental Engineering		Obl.
Mechanics		Obl.

Language of teaching	English
Credits	2
Session	
Exam	Oral
Workload	60h
Hours	28
Courses	20
TP	8
Number of positions	

Frequency

Every 2 years

Remark

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.
- R-UHPFRC structures: fracture and fatigue properties of Ultra-High Performance Fiber Reinforced Composites, structural implications, design provisions.

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 exercises

Assessment methods

Oral exam