CIVIL-704

Fracture Mechanics and Fatigue of Structures

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

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

Remark

Next time: Spring 2024, min. 5 persons.

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 exercices

Assessment methods

Oral exam