

MSE-665

Transport processes in cementitious materials

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Cursus	Sem.	Type
Materials Science and Engineering		Obl.

Language of teaching	English
Credits	1
Session	
Exam	Written
Workload	30h
Hours	15
Courses	14
TP	1
Number of positions	20

Frequency

Only this year

Summary

This course presents an overview of the transport processes occurring in cementitious materials at hydrate scale, pore scale and macroscopic scale. From the theoretical and engineering point of views, the links between microstructure and transport properties are explained.

Content

Introduction, why transport is important in cement and concrete ?

what do we mean by fluid transport, self diffusion, transport diffusion, capillary action, osmosis, contact angle, permeability and dynamic equilibrium, Navier-Stokes, ...

Chloride ingress: from empirical models to mechanistic models

Integrating hydrate assemblage, microstructure and electrostatic properties of C-S-H for predicting chloride ingress

Moisture transport

Carbonation modeling

Finite difference and finite element methods

Lattice Boltzmann

Practice session: FEM or Lattice Boltzmann

Ions at surfaces and ionic transport

Water Transport in restricted geometries

Transport : what can be learnt from molecular simulation for multi-component systems. From bulk solutions to highly confined media

Keywords

Transport, Cementitious materials, Microstructure, Modeling, Durability

Assessment methods

Written exam

Resources**Websites**

- <https://www.eric-etn.eu/>