

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

Note

Organized in the framework of the H2020 MCSA ITN ERICA

Keywords

Transport, Cementitious materials, Microstructure, Modeling, Durability

Assessment methods

Written exam

Resources**Websites**

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