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.erica-etn.eu/