



ERICA

Residential School 3 Modelling transport techniques

Course description

Title	Transport processes in cementitious materials
Language of instruction	English
Course type	PhD The present course is the third of six intensive courses given as part of the ERICA Innovative Training Network, which is a programme funded by the European Community with an emphasis on mobility. The ERICA MSC-ITN supports 13 Early Stage Researchers (ESR) over a period of four years.
ECTS points	1 ECTS Work load: approximately 14 hours of contact plus a report
Schedule	January 14-16, 2019
Location	EPFL, Lausanne
Scope and form	The course consists of connected lectures
Duration	2.5 days
Date of submission of report	To be handed in by 15th February 2019
Type of examination	Short report of 5 pages, your project in connection with the present course
Aid	With aid
Evaluation	Accepted / not accepted
Prerequisites	-
Participants restrictions	Maximum 25
Aim/objective	To introduce the students to selected methods of modelling and characterising transport in porous media
Contents	The following subjects are covered in the course: <ul style="list-style-type: none"> • Transport in porous media, Finite element methods of numerically solving the transport equations in simple and complex geometries. • Lattice Boltzmann methods • Monte Carlo and Molecular Dynamic / Atomistic methods of modelling dynamics. • NMR for determining structure and measuring molecular dynamic and transport phenomena over multiple length and timescales. • Outreach to the public
Overall responsible	Fabien Georget, EPFL-STI-IMX-LMC, room MXG 234, tel: +41 21 69 37852
Co-organiser	Peter McDonald, University of Surrey
Lecturers	- Jean-François Dufrêche, Université de Montpellier, FR - Yogarajah Elakneswaran, Hokkaido University, Japan - David Faux, University of Surrey, UK - Fabien Georget, EPFL, CH - Bruno Huet, LafargeHolcim, FR - Peter McDonald, University of Surrey, UK - Steve Parker, University of Bath, UK - Erica Samson, Simco, Canada

	<ul style="list-style-type: none"> - Richard Sear, University of Surrey, UK - Hong Wong, Imperial College London, UK
Further information	<p>Further information will be posted at: https://www.eric-etn.eu/event/school-3/ or you may contact:</p> <p>Marie-Alix Dalang-Secrétan EPFL-STI-IMX-LMC Bâtiment MX G Station 12 CH - 1015 Lausanne tel: +41 21 693 58 45 fax:+41 21 693 58 00 marie-alix.dalang-secretan@epfl.ch</p>
Costs	<p>Registration and participation to costs: 280 CHF</p> <p>Participants should register on the website</p> <p>Provisionnal accommodation has been made at Hotel Lausanne Guesthouse by Fassbind Rue Marterey 15 1005 Lausanne Tel: +41 21 601 80 00 lg@byf.ch</p> <p>Prices per night :</p> <p>Single room : CHF 120.- (including breakfast) + CHF 2.60 city tax Twin room : CHF 118.- (including breakfast) + CHF 2.60 city tax</p> <p>* Students are encouraged to share a twin room</p> <p>Participants are requested to make their reservation directly at Hotel Lausanne Guesthouse By Fassbind before December 14, 2018 using code ERICA-EPFL</p>

School 3 – Transport Processes in Cementitious materials, EPFL, Lausanne, Switzerland,

14-16th January 2019

Organised by Fabien Georget and Karen Scrivener, EPFL

DRAFT

Monday 14th January 2019

9:00	Introduction	Hong Wong : <i>Introduction, why transport is important in cement and concrete ?</i>
10:00		Richard Sear: <i>what do we mean by fluid transport, self diffusion, transport diffusion, capillary action, osmosis, contact angle, permeability and dynamic equilibrium, Navier-Stokes, ...</i>
12:00		Lunch break
13:30	Case studies	Eric Samson: <i>Chloride ingress: Stadium model</i>
14:15		Yogarajah Elakneswaran: <i>Integrating hydrate assemblage, microstructure and electrostatic properties of C-S-H for predicting chloride ingress</i>
15:00		Break
15:30		Bruno Huet: <i>Moisture transport</i>
16:15		Fabien Georget: <i>Carbonation modeling</i>
17:00		Discussion
19:00		Social event, dinner in town, Crazy Wolf, Lausanne

Tuesday 15th January 2019

8:00	Numerical methods	Fabien Georget : <i>Finite difference and finite element methods</i>
9:30		Peter McDonald: <i>Lattice Boltzmann</i>
11:00		Practice session: FEM or Lattice Boltzmann
12:00		Lunch break
13:30	Atomic scale	Steve Parker: <i>Ions at surfaces and ionic transport</i>
14:30		Dave Faux: <i>Water Transport in restricted geometries</i>
15:30		Break
16:00		Jean-François Dufrêche: <i>Transport : what can be learnt from molecular simulation for multi-component systems. From bulk solutions to highly confined media</i>
17:00		Discussion

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Wednesday 16th January 2019

8:00		Student presentations
10:30		Break
11:00		Discussion
12:00		Lunch break