

## Scope of the course

Multi-scale modelling course for concrete (MMC<sup>2</sup>) provides the opportunity for participants to become familiar with the different ways of schematization and the different numerical approaches that can be followed to simulate the chemical, physical and mechanical behavior of cementitious materials. The main back-bone of the course are the different modelling levels at which heterogeneous and composite cementitious materials can be schematized and how these different levels can “communicate” by means of parameters passing methods or by using upscaling models. The modelling levels that will be distinguished in this course are the nano-, micro-, meso- and the macro-level. The course emphasizes different modelling approaches for each scale level and shows different ways of how the “numerical gaps” can be bridged. The nano-level deals with molecular dynamics of CSH gel, the micro-level with hydration and microstructure, the meso-level with fracture mechanics and brittleness and for the macro-scale level emphasis will be on early-age cracking of hardening concrete and how to use commercial FEM software.

For the course participants, the MMC<sup>2</sup> course provides the chance to acquire a glance of the varieties of the numerical possibilities in an intensive course week of lectures and workshops. The course is set-up in a way that theoretical lectures and practice workshops alternate daily and, besides this, the course participants are also invited to present their own work during elevator pitch presentations. There will be a mix of events and topics centered around the theme of multi-scale modelling that makes the course very “dynamic”.

Following the success of the first four MMC<sup>2</sup> courses held so far (Delft 2008, Nanjing 2009, Bilbao 2010, Delft 2011), this year the course will again take place in Nanjing and will be organized by Southeast University, China, the Microlab of Delft University of Technology and Jiangsu Institute of Building Sciences. Lecturers are from Delft University of Technology, The Netherlands, Tecnalia research institute for nano technology, Spain and South East University, China. Lecturers from Delft University will teach the micro- to macro-scale level whereas lecturers from the Tecnalia research institute will account for the nano-scale level. The upscaling lectures will be a joint contribution of lecturers from Delft and South East University and show how to model the interfaces which make the course a real multi-scale modelling course, i.e. from nano-to-macro!

## Participates

The MMC course is designed for:

- Graduate students (PhD, MSc students and Postdocs)
- Professors and other academic professionals
- Professionals from industry

The course is intended for people working in areas where modelling knowledge of cement-based materials can give you the edge in understanding problems and finding solutions.

The course level is suited for PhD candidates.

No special preliminary or initial training is required for this course, although it is presumed that the participant has basic knowledge of concrete and concrete composition

## When

In October 2012 the annual Fall Course Multiscale Modelling for Concrete will be held for the fourth time. The course is scheduled from **Monday October 8 to Friday October 12, 2012.**

## Where

The MMC Fall Course week will be scheduled at **Nanjing, China.** Jiangsu Bote New Materials Co. will host the MMC course 2012.

**Nanjing** is the capital of China's Jiangsu Province and a city with a prominent place in Chinese history and culture. Nanjing has served as the capital of China during several historical periods, and is listed as one of the Seven Great Ancient Capitals of China. (The other Six: Beijing, Xi'an, Luoyang, Hangzhou Anyang and Kaifeng). Nanjing is also one of the fifteen sub-provincial cities in China's administrative structure, enjoying jurisdictional and economic autonomy province.



# Multi-Scale Modelling of Concrete Course (MMC<sup>2</sup>)

**Nanjing, 8-12 October 2012**

## Lectures

Eddy Koenders, Guang Ye, Jorge S. Dolado,  
Erik Schlangen, Jianjun Zheng,  
Huisu Chen, Zhiwei Qian,

## Organized by

Wei Sun, Klaas van Breugel, Changwen Miao

## Sponsored by

Southeast University  
Materials & Environment, Microlab,  
Delft University of Technology  
Jiangsu Institute of Building Sciences  
Tecnalia research institute for nanotechnology, Bilbao,  
Spain  
RILEM

## Cost

Current position	Costs (EUR)
Participants from China	350
PhD-, MSc-students (proof required),	750
Postdocs	750
Professors / academic professionals	1250
Professionals from industry	2500

The cost includes:

- Course material: handouts
- One week accommodation
- Lunch and refreshments during the day
- One course dinner

## Accommodation

Please send your reservation request to the course organizer.

## Further information

Workshop website: <http://www.event.microlab.citg.tudelft.nl/>

For registration and additional course information, please contact:

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