WORKSHOP 1 : 10:30 AM – 12:45 AM JUNE 8, 2016

« Theoretical and numerical modeling of interface debonding for various materials »

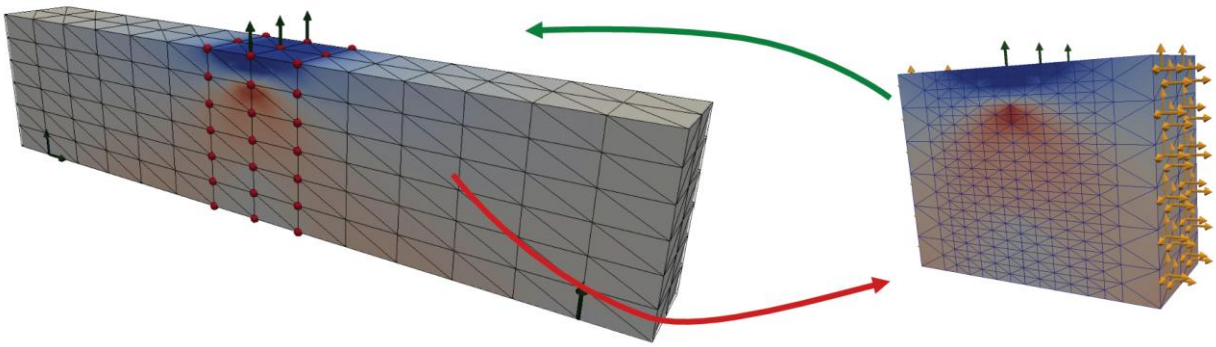
Chair: Nicolas Moës, GEM/Ecole Centrale de Nantes (France)

Nicolas MOËS is full professor at the Ecole Centrale de Nantes (France) and researcher at the GeM (research institute for civil and mechanical engineering). He is one of the co-inventor of the eXtended Finite Element Method (X-FEM) for fracture mechanics and for other applications like material interfaces. He received the young investigator award from the IACM (International Association for computational Mechanics) in 2006 and was declared IACM fellow in 2008. In 2014, he received the silver medal from CNRS.

« Two-Scale Generalized Finite Element Methods for Three-Dimensional Cohesive Propagating Fractures »

Armando DUARTE is a Professor and Excellence Faculty Scholar at the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign (USA). His research focuses on computational mechanics and Generalized Finite Element Methods with focus on computational fracture mechanics, hydraulic fracturing, multi-scale and multi-physics problems such as sharp thermal gradients and small cracks in aircraft structures.

Abstract. We summarize recent advances on the Generalized FEM with global-local enrichments. This method involves the solution of local boundary value problems to capture cohesive fracture behavior, which is embedded in a coarse, structural-scale mesh via enrichment functions. The method accommodates approximation spaces that evolve in between load steps while maintaining a fixed global mesh, which avoids the need to map solutions and state variables on changing meshes typical of traditional adaptive approaches.



« Debonding of textile reinforced mortar on masonry substrates »

Gianmarco de FELICE is professor of structural engineering and head of the group of structures at Roma Tre University (Italy). He is chairman of the RILEM Technical Committee TC-250 *Composites for Sustainable strengthening of Masonry*. His current research encompasses the structural performance of architectural heritage, the seismic assessment and retrofitting of masonry and reinforced concrete structures, the development of strengthening systems with composites.

Abstract. Innovative strengthening systems made of composites with mortar-based matrix are currently used as externally bonded systems for strengthening masonry structures. Their use in engineering practice is however carried out in the absence of appropriate knowledge of their mechanical properties and without suitable design guidelines. The present note will discuss these items, starting from the recent experimental outcomes.

« Computational multi-scale frameworks for the modelling of failure of masonry structures »

Thierry J. MASSART is Professor at the Ecole Polytechnique de Bruxelles, Université Libre de Bruxelles (ULB, Belgium). He obtained his PhD from the Eindhoven University of Technology (The Netherlands), and is a former Marie Curie fellow at McGill University, Canada. His research focuses on multi-scale modeling of failure and coupled processes in materials and structures.

Abstract. The formulation of macroscopic constitutive laws for the failure behaviour of masonry is complex due to its strongly heterogeneous structure. The use of two-scale computational frameworks for masonry, in which the material behaviour of structural masonry is sampled through computational homogenization, will be discussed. Proper methodologies for the upscaling of fine scale degradation towards discrete macroscopic cracking will be developed and illustrated.