

Abstract for The 8th International Conference of the Hellenic Society of Rheology (HSR2017) Limassol, Cyprus, 12-14 July, 2017

Title: Numerical prediction of the rheological properties of fresh self-compacting concrete

Haiqin HUANG, Prof. Andreas ZILIAN
Université du Luxembourg, Luxembourg

Abstract: Self-Compacting Concrete (SCC) is a high-performance construction material that can simplify classical handling on concrete construction by avoiding the need for additional vibrational compaction. Challenges in the use of SCC lie in ensuring optimal operation of the material in terms of properly filled castings in presence of complex reinforcement arrangements, reduction of entrained gas bubbles and limitation of aggregate separation. A major factor influencing the aforementioned aspects is the rheological properties of SCC mixtures under varying conditions (e.g. content composition, mechanical impact, temperature, moisture). This contribution aims at unified constitutive modelling of SCC in the setting stage. Concrete setting describes the transition from fluid-like fresh concrete, which -in presence of time-dependent transport-reaction processes- develops a porous cementitious structure, to hardened concrete showing solid-like behaviour. The constitutive model is implemented using the open-source finite element framework FENICS and applied to a number of benchmark problems.