

CE 295 - RESEARCH SEMINARS in STRUCTURAL & GEOTECHNICAL ENGINEERING

Capillary pressure monitoring in plastic concrete for controlling early age shrinkage cracking

Date: Thursday, May 29th, 2014

Time: 4:00 – 4:50 pm

Room: MSTB - 124

Guest Speaker: Dr. Volker Slowik

In concrete structures, cracks may occur already within the first few hours after casting, i.e., when the material is still in its plastic stage. Evaporation of water leads to the build-up of a capillary pressure in the pore system of the material and, possibly, to the so-called plastic or capillary shrinkage cracking. By appropriate curing measures, the evaporation rate may be reduced significantly and cracking is normally prevented. Nevertheless and despite the advances in concrete technology, plastic shrinkage cracking is still a serious and not completely solved problem in the construction industry.

If the capillary pressure as the driving force for plastic shrinkage cracking is monitored by appropriate technical means, it would be possible to evaluate the cracking risk on site and to control curing measures accordingly. The measured capillary pressure captures the influences of the material composition, of the environmental conditions, and of the member's geometry. Based on research results concerning plastic shrinkage of cementitious materials, a wireless sensor system for on-site applications has been developed. Results of laboratory experiments are presented and, by means of some examples, the usefulness of the on-site capillary pressure measurement is discussed.

Prof. Volker Slowik obtained his doctoral degree in Civil Engineering from Technische Hochschule Leipzig, Germany. After research work in Switzerland and in the US, he became in 1995 Professor of Structural Mechanics at the Leipzig University of Applied Sciences. Since 2001, he is head of the Institute of Experimental Mechanics at the same university. His research interests include the application of fracture mechanics to quasi-brittle materials as well as the experimental safety evaluation of existing concrete and masonry structures. Currently, he is a Visiting Scholar at the University of California, Irvine.

