

Concrete creep in research and design

In the last century, concrete has become the most widespread construction material in spite of its complex nature. Concrete is not only a composite material with a highly nonlinear quasi-brittle behavior but has also a pronounced aging behavior as a consequence of long lasting chemical reactions. The resulting positive evolution of mechanical properties on one side is balanced by significant shrinkage and creep processes on the other side. Performance based design of engineering structures and structural members requires an in-depths understanding of all the above mentioned phenomena. The focus of this presentation is aging visco-elasticity. Starting with a short introduction to creep in general, and modeling concepts for creep the current design provision according to Eurocode and the *fib* model code 2010 are reviewed, followed by recent developments in the formulation of integral creep laws – the new RILEM recommendation B4. More complex design and especially research problems require point-wise rate-type numerical analysis. A state-of-the-art numerical framework pioneered by Bažant and co-workers is introduced and its application to structural analysis as well as research is presented.