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# FATIGUE OF CONCRETE IN AN EXPERIMENTAL-VIRTUAL-LAB

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## ABSTRACT

Modern high-performance concretes allow even lighter, more filigree and resource efficient structures, which, however, are more susceptible to vibrations due to their reduced dead weight. Structures and components such as long span bridges for high speed trains, wind power plants or machine foundations are also typically subjected to very large variable loads and a very high number of load cycles. The fatigue behaviour of the high-performance concrete is decisive for the design and the realization of such concrete applications. The aim of this special session is to bring together experts in material degradation of high-performance concrete with focus on capturing, understanding, describing, modelling and predicting the damage process using the newest experimental and numerical methods. Since the damage processes occur on a very small scale, they cannot be entirely observed during the load tests. The recording of suitable damage indicators during the experiments make the time-consuming fatigue tests already very demanding. Therefore a close cooperation between the material science and the numerical mechanics knowledge is required, which is the interconnection of experiment and computation in the Experimental-Virtual-Lab. Topics of interest include the model-based description of the heterogeneous concrete microstructure (with and without fibres) as well as the damage and crack developing at different scale levels and for different moisture conditions from a material and numerical science point of view.