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UNCERTAINTY IN CREEP AND SHRINKAGE PREDICTION MODELS FOR CONCRETE

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Abstract

The lifetime performance, and consequently the total life cycle costs of engineering structures, are significantly influenced by the accuracy of the prediction models used. For aging concrete structures,these are mainly deterioration models (chloride ingress, reinforcement corrosion,carbonation), as well as models for time-dependent changes in material characteristics,such as creep and shrinkage (CS). In the design phase, the prediction models govern not only the inherent safety level but also greatly affect the expected lifetime performance. For existing structures, they are a key element in the assessment of structural safety and the remaining life time. Although probabilistic performance assessment techniques and life cycle cost analyses are well established tools, suitable stochastic models for the input parameters are, for the most part, still missing. A recently expanded database of laboratory CS tests as well as multi-decade bridge deflection data became now available,making it possible to quantify the uncertainty of CS-models embodied in the current design codes and standard recommendations. In this study, statistical indicators for the short-term and long-term predictions have been determined.They can be used for determining the safety levels associated with different code provisions and can improve the accuracy of probabilistic assessment methodologies. Furthermore, sensitivity studies for the main input parameters will be presented.