Probabilistic forecasting method for concrete creep prognosis under model-form uncertainty

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ABSTRACT

Time-dependent deformation of structural concrete may cause cracks and has much to do with durability performance of structural concrete. Therefore, it is important to make a reliable prognosis for the time-dependent deformation. Creep is one of the time-dependent deformations under sustained strains generated by permanent loads. In order to predict the creep behavior, several model codes are available from different professional societies: ACI, *fib* 2010, KCI and so on. Consequently, model-form uncertainty (or model selection) inevitably arises from the competing prediction models. In this situation, classical statistical method may be used to select a best model with a measure of the relative quality of the prediction models given the measurement. In this study, we propose a practical method to improve the creep prediction by combining predictions from competing prediction models. The premise of the proposed method is to use and share the information of individual models rather than using a single model. The combined prediction is estimated by taking a weighted linear combination of the individual prediction models (probabilistic forecasting). A set of weights are determined by maximizing the likelihood between combined prediction and measurement. The performance of the proposed method was evaluated using a creep test. The classical statistical method was also performed to compare with the proposed method.