

Probabilistic Modeling of Concrete Structures Degradation

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Abstract

Durability and reliability are often crucial structural performance characteristics and the assessment of the reliability level for relevant limit states has to be analyzed frequently utilizing mathematical models for degradation prognosis, especially for concrete structures. In doing this it can be useful to have more models available for the structural task in question. The engineer select a suitable one with respect to the type of relevant limit state, but frequently, from pragmatic reasons, the model choice is based on availability of model data and availability of an effective software. Simplified models, probabilistic approach and simulation techniques are the useful choice for practical use enabling the assessment of service life and associated reliability level for appropriate limit states.

For such purposes the FReET-D software has been developed - see www.freet.cz. Its development is continuous; in its first phase - see Teplý et al. (2007) - the SW tool encompassed 29 models or model variants for carbonation of concrete, chloride ingress, reinforcement corrosion and frost attack. In the present paper some newly added models are presented for:

- residual strength and ductility of corroded reinforcement based on Du et al. (2005) and Tee et al. (2011);
- destruction of concrete in sewer collection systems based on ASCE (2007);
- degradation of concrete due to acid attack – see fib Model Code (2010).

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