

Durability assessment of large surfaces using standard reliability methods

M. Sykora, M. Holicky

Department of Structural Reliability, Klokner Institute, Czech Technical University in Prague, 16608 Prague, Czech Republic, miroslav.sykora@klok.cvut.cz, milan.holicky@klok.cvut.cz

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Abstract

It is well recognized that durability limit states defined in ISO 13823 (2008) may be of uttermost importance for serviceability as well as ultimate limit states of reinforced concrete structures. However, practical applications of durability assessments may be difficult as basic variables influencing structural durability are often random quantities with a considerable spatial variability that should be considered as random fields. Application of common discretisation techniques, see e.g. Allaix et al. (2009), may be rather cumbersome and require a considerable amount of input data.

A simplified probabilistic model for spatial variation is thus proposed to allow for durability analysis of large surfaces using efficient reliability methods such as FORM/SORM. The technique is applied in the example of carbonation of concrete. Spatial variation of the carbonation depth and concrete cover is considered.

It appears that the proposed technique requires acceptable computational demands and yields sufficiently accurate estimates for practical applications. Moreover, the technique is foreseen to be particularly useful for optimisation studies.

References

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