Development of a decision support tool for corrosion prediction in reinforced concrete structure exposed to carbonation and chlorination

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Résumé

This paper presents a decision support tool developed for corrosion prediction in highroad and maritime structures. The main framework is developed in python and consists in a graphical interface allowing the user to access various models extracted from literature. Carbonation and chlorination can be considered as well as the corrosion following both depassivation phenomena, allowing the prediction of the service life of reinforced concrete structures. To ease the use of this tool and maximize its capacity to consider a wide range of cases, an important work is dedicated to the obtaining of the input data. Therefore, if the basic composition and environmental conditions are filled out in the application, the overall modelling can be performed independently of the input parameters required for the models functioning. The different functioning steps of the applications are detailed along with the different algorithms, models and data processing used. Finally, a probabilistic approach based on FORM (First Order Reliability Method) is integrated to the tool and tested with the prediction of three maritime structure failure probability for their respective service lives. The results are verified with on-site chloride concentration measurements.

Mots-Clés: Chloride ions, Maintenance, low, carbon concrete, reinforced concrete structure, Corrosion, service life prediction, maritime environment

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