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Thesis

A Novel Approach for Practical Modelling of Steel Corrosion in Concrete

Abstract

A novel and practical model for predicting the corrosion rate of the steel reinforcement in concrete is developed. This model is based on Stern-Geary equations and includes the effects of concrete properties and the environmental conditions on corrosion. The influence of temperature, cover depth, concrete resistivity and the limiting current density is incorporated in the model. In addition, the half-cell potential measurement technique is modeled numerically, and guidelines for quantitative and qualitative interpretation of the half-cell results are provided. The half-cell potential measurements are related to the kinetics of the corrosion process, and a separate model for predicting the corrosion of steel in concrete through half-cell data is developed. A comprehensive verification study demonstrated the strength and the applicability of the developed models in different scenarios.

Degree

M.A.Sc.

Completion

2007

Supervisor

Igor