

Axial, Bending Interaction Diagrams of Reinforced Concrete Columns Exposed to Chloride Attack

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Abstract : Chloride induced reinforcement corrosion is widely accepted to be the most frequent mechanism causing premature degradation of reinforced concrete members, whose economic and social consequences are growing up continuously. Prevention of these phenomena has a great importance in structural design, and modern Codes and Standard impose prescriptions concerning design details and concrete mix proportion for structures exposed to different external aggressive conditions, grouped in environmental classes. This paper focuses on reinforced concrete columns load carrying capacity degradation over time due to chloride induced steel pitting corrosion. The structural element is considered to be exposed to marine environment and the effects of corrosion are described by the time degradation of the axial-bending interaction diagram. Because chlorides ingress and consequent pitting corrosion propagation are both time-dependent mechanisms, the study adopts a time-variant predictive approach to evaluate the residual strength of corroded reinforced concrete columns at different lifetimes. Corrosion initiation and propagation process is modelled by taking into account all the parameters, such as external environmental conditions, concrete mix proportion, concrete cover and so on, which influence the time evolution of the corrosion phenomenon and its effects on the residual strength of RC columns.

Keywords : pitting corrosion, strength deterioration, diffusion coefficient, surface chloride concentration, concrete structures, marine environment

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