Short Communication

Carbonation and Electrochemical Corrosion Resistance of Mild Steel Rebar in Concrete Modified by Sodium Polyacrylate as Super Absorbent Polymer exposed to 3.5 wt% NaCl Solution

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doi: 10.20964/2021.06.56

Received: 12 February 2021 / Accepted: 6 April 2021 / Published: 30 April 2021

In this research, Portland cement (PC) was replaced by sodium polyacrylate (SP) admixture as a super absorbent polymer to consider the carbonation and electrochemical corrosion resistance of mild steel rebar in 3.5wt% NaCl solution. Electrochemical impedance spectroscopy technique, carbonation resistance test and compressive strength were used to assess the mechanical and corrosion resistance of mild steel reinforced concrete. The results indicated that the SP admixtures significantly improved the resistance of chloride penetration and carbonation of concrete. The concrete samples containing 0.5 kg/m³ SP (SP3) was found as an optimal value of compressive strength. The EIS results show that the highest value of corrosion resistance was obtained for the SP3 sample. The electrochemical result indicates that the addition of SP admixture in concrete structure increase the corrosion resistance and durability of mild steel rebars after being exposed to a corrosive environment by preventing the surface of rebar from reaching the chloride ions. The surface morphologies of the mild steel rebar in PC with SP admixture was more uniform and lower pitting corrosion than the PC mix, which was consistent with electrochemical results.

Keywords: Carbonation resistance; Electrochemical corrosion resistance; Sodium polyacrylate; Modified concrete

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