Short Communication

Influence of Zirconium Content on Corrosion Resistance of Micro-Alloyed Steel Reinforced Concrete in Chloride Solutions

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doi: 10.20964/2020.05.84

Received: 13 January 2020/ *Accepted:* 6 March 2020 / *Published:* 10 April 2020

Corrosion resistance of zirconium(Zr) micro-alloyed steel rebar in the artificial seawater environment were investigated by electrochemical technique. Electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization techniques were used to study the effect of Zr content on corrosion behavior of carbon steel rebars. The polarization plots show that the steel rebar with 0.15 wt% Zr content had a smaller corrosion current-density than the other samples which was in the passive state during the test. The EIS results indicate that double-layer capacitance value is reduced with the increase of Zr content which reveals that the passive film thickness increased resulting in an enhanced protective capacity when the Zr content of steel rebar gradually increased. The EIS results are in accordance with the best-fit findings for double-layer capacitance at the steel-concrete interface which were gradually increased over $4.5 \mu\text{Fcm}^{-2}$ with 3 wt% NaCl in the artificial seawater, demonstrating that produced corrosion may occur on the surface of steel rebar.

Keywords: Zirconium micro-alloyed steel reinforced concrete; Corrosion resistance; Chloride concentration; Electrochemical technique

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