Short Communication

Corrosion Behavior of ASTM A615 Steel Rebars Embedded in Concrete with Ceramic Waste Dust as a Partial Replacement of Portland Cement

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In the present investigation, the effect of ceramic waste dust (CWD) as a partial replacement of Portland cement (PC) on the corrosion behavior of ASTM A615 steel rebar were evaluated by electrochemical impedance spectroscopy (EIS), open circuit potential (OCP) and water absorption tests after exposure to the marine environment. All samples with CWDs show a decrease in water absorption with increasing exposure time compared to the PC concrete. The samples with 15% CWD revealed the highest compressive strength during the entire exposure time in 3.5 wt% NaCl solution. The OCP value of the reinforced concrete samples with 15 wt% CWDs stayed in the low or uncertain corrosion area for much longer. The surface morphologies of carbon steel rebars indicated that the amount of pitting corrosion on the steel bar embedded in 15 wt% CWD concrete sample was significantly lower than that of the others. The electrochemical results showed that the higher content of CWDs up to 15 wt% in PC has significantly improved the concrete structure as well as reduced corrosion rate.

Keywords: Ceramic waste dust; Partial replacement of Portland cement; Corrosion resistance; Carbon steel rebar; Electrochemical technique

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