Corrosion Behavior and Service Life Evaluation of Epoxy Coated Rebar under Marine Environment

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Abstract Epoxy coated rebar (ECR) as a promising alternate measure to enhance the durability of bridge under marine environment has been applied for many years. However, the detection of ECR serviced in bridge from USA and China exhibited a contradictory performance. Herein, the corrosion behaviors of ECR serviced in South China for 25 years are tested and analyzed both by field and laboratory experiments. The field result indicated that the surface of concrete was intact and no crack or peeling were observed, most of the open circuit potential of ECR was high to -100 mV vs. CSE. The further laboratory tests show that the chloride has immigrated into the concrete cover of ECR (25mm), while the surface of ECR was integrity and compact. The impedance spectrum and polarization curves revealed that the ECR still exhibited a high resistance to marine environment with the $|Z|_{0.01Hz}$ of 1.04×10^{8} Ω·cm^2 and i_{corr} of 7.13×10^{-5} μAcm^{-2}, E_{corr} of -144 mV vs. CSE. Based on the above results, a service life evaluation model of ECR in concrete under marine environment was proposed.