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Modelling stochastic response of type 304 stainless steel (SS-304) crevice corrosion in chloride environments

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ABSTRACT

The stochastic corrosion response of creviced SS-304 in chloride environment was studied. The crevice assembly used for this study comprised coupon (SS-304), polytetrafluoroethylene (crevice former) and fasteners (titanium bolt, nut and washers) designed in three configurations with crevice scaling factor of 8, 16 and 24, respectively. An immersion test was carried out on each configuration having 40 crevice sites and immersed in various chloride solution concentrations of 1.5, 3.0 and 4.5 w/w % simulating environmental conditions A, B and C, respectively, for 60 days to study the stochastic nature of the initiation and propagation of cc in chloride environments according to ASTM G-78. Data obtained were used to develop a Monte Carlo's model of the crevice corrosion pattern which confirmed the stochastic nature of the crevice corrosion. The probability of attack of SS-304 within 30 days was 0.150, 0.300 and 0.425 for A, B and C, respectively, while the extreme value of the propagated depth of attack was predicted from the stochastic models developed. The developed model is a useful tool for predicting the maximum depth of attack possible under uncertain crevice corrosion of SS-304 in chloride environment.

KEYWORDS: Modelling, type 304 stainless steel, crevice corrosion, chloride environments, stochastic response

Additional information

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Disclosure statement

No potential conflict of interest was reported by the authors.

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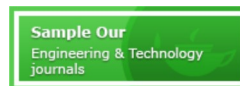
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