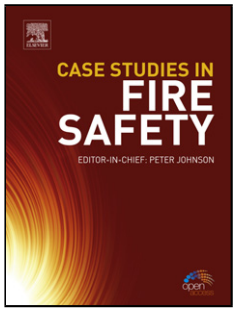

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Customization of the Coupled Environment Fracture Model for predicting stress corrosion cracking in Alloy 600 in PWR environment

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Highlights

- The CEFM model has been customized to predict the crack growth rate in Alloy 600.
- The CEFM successfully predicts the effect of independent variables on the CGR.
- The mechanism of PWSCC in Alloy 600 has been analyzed.

Abstract

The coupled environment fracture model (CEFM) has been modified and calibrated to predict crack growth rate (CGR) in Alloy 600 under typical PWR primary coolant conditions. The customized CEFM provides quantitative predictions of the effects of stress intensity factor, hydrogen concentration, yield strength, and temperature on CGR in Alloy 600 in PWR primary coolant environments, as well as explaining the dominating mechanism of stress corrosion cracking (SCC) in this alloy. The importance of the mechanical properties, such as yield strength and stress intensity factor, as identified previously from Artificial Neural Network (ANN) analysis of CGR data in the literature, has been confirmed theoretically. The success in explaining the