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# Study on Effect of Reverse Cyclic Loading on Fracture Resistance Curve of Equivalent Stress Gradient (ESG) Specimen

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**Abstract :** Since massive earthquakes in the world have been reported recently, the safety of nuclear power plants for seismic loading has become a significant issue. Seismic loading is the reverse cyclic loading, consisting of repeated tensile and compression by longitudinal and transverse wave. Up to this time, the study on characteristics of fracture toughness under reverse cyclic loading has been unsatisfactory. Therefore, it is necessary to obtain the fracture toughness under reverse cyclic load for the integrity estimation of nuclear power plants under seismic load. Fracture resistance (J-R) curves, which are used for determination of fracture toughness or integrity estimation in terms of elastic-plastic fracture mechanics, can be derived by the fracture resistance test using single specimen technique. The objective of this paper is to study the effects of reverse cyclic loading on a fracture resistance curve of ESG specimen, having a similar stress gradient compared to the crack surface of the real pipe. For this, we carried out the fracture toughness test under the reverse cyclic loading, while changing incremental plastic displacement. Test results showed that the J-R curves were decreased with a decrease of the incremental plastic displacement.

**Keywords :** reverse cyclic loading, j-r curve, ESG specimen, incremental plastic displacement
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