

Probabilistic Prediction Model for SCC Initiation Time on Alloy 600 CRDM Nozzle

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Abstract

The life of components made of alloy 600 due to PWSCC can be expressed by the sum of initiation and crack propagation time. Since PWSCC initiation mechanism is not fully understood, the time can be determined probabilistically with a Weibull model. Relatively the crack propagation rate is well defined as a function of the stress intensity factor.

From this relation the propagation time can be obtained. A life prediction method has been developed with the model on the crack initiation time. The Weibull model is integrated over the entire surface of a nozzle in order to determine the probability of crack initiation as function of time. To obtain larger number of data, the intra-specimen method is shown to be useful. The size requirement for an intra-specimen is developed to establish the statistical equivalence between intra-specimens. A proof of principle test has been conducted in a sodium tetrathionate solution at 40 °C loaded by the four-point bending method. Results show that the method can be developed through high temperature tests for the application to PWR Control Rod Driving Mechanism (CRDM).

중수로 원자로 열전송 배관계통의 진동 건전성평가

Evaluation and Verification on Primary Heat Transportation Piping System Vibration of CANDU-PHW Nuclear Power Plants

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요약

본 논문에서는 '90년도 이후 국내에 건설되어 이미 상업운전을 하고 있는 월성원자력 2, 3, 4호기의 시운전 기간 중 열전송배관계통에 대하여 가동전 진동건전성 평가시험을 ASME/ANSI OMa-1990 Standard, Part 3에 수행된 열전송계통의 진동 데이터 및 해석결과 등을 중심으로 기기의 설치조건이 배관에 미치는 영향을 고찰하였다. 그 결과 국내 중수로 발전소의 열전송계통 배관계는 발전소 수명기간동안 진동 건전성을 확보하고 있는 것으로 평가되었다.