



Stress Corrosion Cracking Initiation Behavior of Alloy 600 with the Consideration of Long-term Thermal Aging and Triaxial Stress State

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In present study, the effects of thermal aging and triaxial stress were investigated in terms of primary water stress corrosion cracking susceptibility. The long-term thermal aging was conducted by accelerated heat treatment at 400 °C which is one of the highest temperature which will not cause any formation of excessive carbides or precipitates which will not be formed at operational environment of nuclear power plant. Triaxial stress was applied via making round notch at the surface of round tensile bar.

Stress corrosion cracking susceptibility was investigated by slow strain rate test with in-situ monitoring by direct current potential drop method. 10 years thermally aged specimen exhibited the highest susceptibility to stress corrosion cracking and as-received specimen shows lowest susceptibility under mono-axial stress state. The trend was different with triaxial stress applied; 20 years thermally aged specimen shows highest susceptibility and as-received specimen shows lowest.

Parameters which could represent each aspect were established by Orowan mechanism and critical resolved shear stress. And those parameters were inserted to stress corrosion cracking initiation model and establish a model that could reflect the effect of long-term thermal aging and triaxial stress to stress corrosion cracking initiation of Alloy 600.