Proceedings of the Korean Nuclear Society Spring Meeting
Pohang, Korea, May 1999

Corrosion model for Zircaloy-4 cladding in PWR

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ABSTRACT

To improve the corrosion model of the fuel performance analysis code COSMOS, a model was developed considering thermohydraulic phenomena and the effect of water chemistry and low Sn in the alloy composition on the corrosion behavior. It is assumed that the lithium enhancement factor influences the corrosion behavior only if the subcooled void is present in the coolant.

The developed model was verified with the database obtained from Grohnde and Ringhals 3 reactors. Comparison of predicted oxide thickness with measured data showed the applicability of COSMOS code to analyze the cladding oxidation.

In the future, the effect of the hydride in the cladding and the precipitate changes due to irradiation should be included.