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Reactor Pressure Vessel Embrittlement: Insights from Neural Network Modelling

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Abstract

Irradiation embrittlement of steel pressure vessels is an important consideration for the operation of current and future light water nuclear reactors. In this study we employ an ensemble of artificial neural networks in order to provide predictions of the embrittlement using two literature datasets, one based on US surveillance data and the second from the IVAR experiment. We use these networks to examine trends with input variables and to assess various literature models including compositional effects and the role of flux and temperature. Overall, the networks agree with the existing literature models and we comment on their more general use in predicting irradiation embrittlement.

Keywords: Reactor Pressure Vessel Embrittlement, Irradiation Damage, Neural Networks.

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