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Temperature and Composition Dependent Thermal Conductivity Model for U-Zr Alloys

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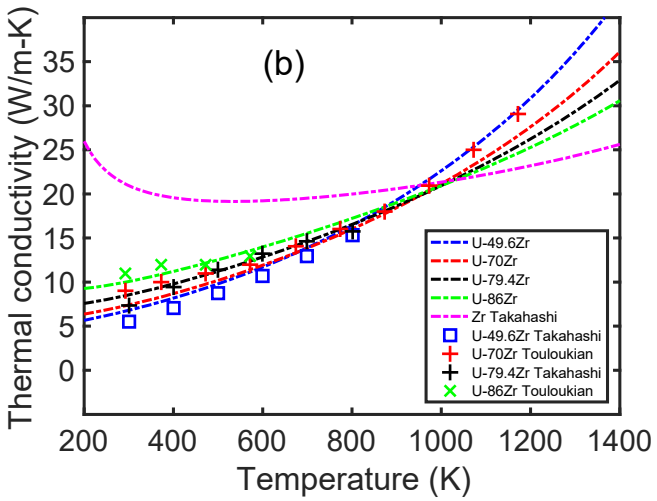
Abstract

Uranium-zirconium (U-Zr) based metallic fuels are promising fuel forms for next-generation fast reactors. The presence of temperature gradient and constituent redistribution in U-Zr based fuels can induce the formation of different phases that have different physical properties such as thermal conductivity. In this work, a semi-empirical model is developed to predict the thermal conductivities of U-Zr alloys for the complete composition range and a wide range of temperatures. The model considers the effects of different electron scattering mechanisms on the electronic thermal resistivity in pure metals. A new mixing rule is used to predict the effective thermal conductivity in U-Zr alloys by taking the alloying effects into account. The thermal conductivity predictions by the new mode show good agreement with the available experimental data. In comparison with previous models, the new model has further improvement, in particular for high-U and high-Zr alloys.



Biography

B.S, MSE in Wuhan University of Technology (WHUT) 2011-2015

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