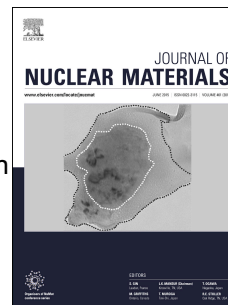


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Diffusivity of Hydrogen Isotopes in the alpha phase of Zirconium alloys interpreted with the Einstein flux equation

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ABSTRACT

Deuterium diffusion profiles comprising measures of concentration and distance inbound from a deuteride surface layer, for different temperatures and times, were regressed to a diffusivity relation derived from the Einstein flux equation. Diffusion of deuterium in the three principal directions of anisotropic Zr-2.5Nb showed no statistical differences; any effect of discontinuous β -phase on diffusion is within the 20% scatter seen for diffusivity values. Consequently, a single diffusivity relation for hydrogen isotopes in zirconium alloys, comprising mostly alpha phase, was determined by combining diffusivities from this study and previous work for protium, deuterium, and tritium, in Zr-2.5Nb and Zircaloy.

Key words: diffusivity, hydrogen isotopes, zirconium alloys, stress-concentration factor

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