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Modelling anelastic contribution to nuclear fuel cladding creep and stress relaxation

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Abstract

In fuel behaviour modelling accurate description of the cladding mechanical response is important for both operational and safety considerations. While accuracy is desired, a certain level of simplicity is needed as both computational resources and detailed information on properties of particular cladding may be limited. Most models currently used in the integral codes divide the mechanical response into elastic and viscoplastic contributions. These have difficulties in describing both creep and stress relaxation, and often separate models for the two phenomena are used.

In this paper we implement anelastic contribution to the cladding mechanical model, thus enabling consistent modelling of both creep and stress relaxation. We show that the model based on assumption of viscoelastic behaviour can be used to explain several experimental observations in transient situations and compare the model to published set of creep and stress relaxation experiments performed on similar samples. Based on the analysis presented we argue that the inclusion of anelastic contribution to the

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