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Speaker 1

Characterisation of the effects of oxide dispersion strengthening on the tensile deformation and elastic properties of Eurofer97



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ABSTRACT:

Augmentation of the mechanical properties of reduced activation ferritic martensitic steels for structural application in nuclear fusion reactors is an area which attracts a great deal of interest. In the presented work, the effect of temperature on the elastic and microstructural properties of 0.3% wt Y₂O₃ oxide dispersion strengthened steel Eurofer97 is investigated using synchrotron high energy X-ray diffraction in-situ tensile testing, alongside the non-oxide strengthened base steel as a point of comparison. The single crystal elastic constants of both steels are experimentally determined through analysis of the diffraction peaks corresponding to specific grain families in the polycrystalline samples investigated. Furthermore, the effect of temperature on the evolving dislocation density and character in both materials is interrogated, providing insight as to deformation mechanisms present. Finally, the constitutive flow stress model is used to evaluate the factors affecting yield strength, allowing the strengthening contribution of the oxide particles to be evaluated.

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