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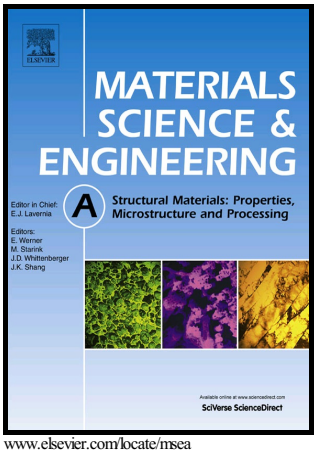

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Abstract

Creep crack growth behavior of the 9Cr-1Mo steel under multi-axial stress state at 600 °C was investigated by a modified creep damage model. Firstly, a modified creep damage model was proposed and incorporated into the finite element software ABAQUS by the CREEP subroutine. And then the creep and damage behaviors of the 9Cr-1Mo steel were simulated by the notched bar and CT specimen. The results indicate that the multi-axial creep ductility and the life of the high temperature components calculated by the modified model are corresponding well with the experimental data, and the life prediction precision has been greatly improved compared to that from the K-R model. This demonstrates that the proposed model can be used to accurately predict the creep crack growth behaviors of the high temperature materials. The creep crack growth rate $\dot{a}$ presents a linear relationship with the crack driving force parameter C^* in log-log coordinate system. Based on the established relationship between the $\dot{a}$ and C^*, the creep crack growth rate of the 9Cr-1Mo steel components working at high temperatures can be predicted.

Key words: Creep crack growth; Multi-axial stress state; Creep ductility; Creep

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