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A Computational Design Study of Self-healing Creep Resistant Steels

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Background Self-healing behaviour ^[1] Precipitation-based self-healing alloy Model alloys: Fe-Cu, Fe-Au, Fe-Mo, Fe-W Damage formation 0.15 - (b)100 MPa Fe-Cu-solutionized (AQ) Homogenisation temperature Fe-Cu-solution-depleted (Ann) Fe-Cu-Ann 🛿 Fe-Cu-AQ Temperature Solubility of the precipitate in 0.10 Matrix the matrix Strain Service temperature Matrix + Precipitate



Au-riched precipitation and the enhanced creep lifetime ^[1]

Fe-Au-AQ

Aim: a multi-elemental, self-healable, creep resistant ferrous system with adequate mechanical properties for elevated temperature use. \bullet

Model Description



Future Work

- To determine the optimal composition for the first generation creep resistant steel with the self-healing capability; \bullet
- The study of the creep behaviour of the designed alloy; the research on the mechanism properties after the healing behaviour;
- Model development and optimisation: the change in the driving force for precipitation during the healing process.

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