**A novel rate based methodology for Creep Fatigue life estimation of materials**

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**ABSTRACT:**

In this present work, we discuss strain rate based methodologies to predict creep fatigue life of materials. The idea is motivated by Mean strain rate based approaches. As creep is the rate controlling damage process in creep fatigue interaction, mean strain rate model considers creep strain rate as an important variable. Prediction accuracy of mean strain rate model decreases when applied to strain controlled cases. We developed a prediction method purely based upon a relative accumulation of creep and fatigue strain. This method predicts the creep fatigue life in strain-controlled regions successfully. We tested different microstructures of Haynes 282 and IN 718, two Nickel-based superalloys. We found suitable microstructure sensitive constants in a lifing model. These constants can rank different microstructures produced by heat treatment of same materials against their creep fatigue performance.

*Keywords: creep-fatigue interaction, superalloy, Relative rate of interaction, Life prediction*