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# Fatigue crack growth under large scale yielding condition: the need of a characteristic length scale

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## Abstract

Fatigue crack growth under large scale yielding condition is studied for a commercial base Co superalloys, Ha188, for single edge notch (SENT) specimen. Due to very high temperature and applied strain values, it is observed that major crack interacts with micro-cracks pattern. These micro-cracks are found to be associated to strain localization and local high triaxiality stress ratio. Detailed analysis of strain localization and stress concentration was used to define an optimal characteristic length used in a non-local modeling of strain energy involved in crack growth process. To obtain robust and low time consuming crack growth modeling, a post-processing methodology is thus proposed for fatigue crack growth under large scale yielding. This point was successfully achieved for SENT specimen test series to describe crack growth rate. Finally, test driven for another geometry has enabled to validate the proposed modeling methodology.

*Keywords:* Low cycle fatigue, Strain energy method, High temperature fatigue, Non-local model, In situ observation

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