

The anisotropic fatigue short crack initiation and propagation behaviours of a directionally solidified (DS) superalloy CM247LC at room temperature

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Abstract

The effects of mechanical and microstructural anisotropy on short fatigue crack initiation and propagation behaviours of a directionally superalloy have been studied. An unusual result was found where the fatigue lives of specimens with grains longitudinally aligned along the loading direction fail at lower lifetimes than the specimens with transversely loaded grains when the applied stress is close to the yield stress. This is mainly attributed to the lower Young's modulus of the longitudinal specimen, which induces more local plastic strain (at stress concentration features) leading to earlier crack initiation and faster crack propagation under the applied test stress.

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