

**A Probabilistic Approach to the Modeling of Fatigue in Gamma-Based Titanium Aluminides**

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**Abstract**

This paper presents a statistical framework for the modeling of fatigue in gamma-based titanium aluminide intermetallics. Following an initial description of the physics of fatigue crack growth, a deterministic fracture mechanics model is presented for the estimation approaches are of fatigue life. This is used as a basis for the development of a probabilistic model for the estimation of fatigue life due to variabilities in the initial flow size. The predicted variabilities are compared with measured variabilities from multiple fatigue life experiments performed on three cast lamellar gamma alloys. The implications of the results are then discussed for the estimation of material reliability in gamma-based titanium aluminide intermetallics.