

Accepted Manuscript

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PII: S0142-1123(16)30270-5

DOI: <http://dx.doi.org/10.1016/j.ijfatigue.2016.09.004>

Reference: JIJF 4068

To appear in: *International Journal of Fatigue*

Received Date: 28 June 2016

Revised Date: 9 September 2016

Accepted Date: 12 September 2016



Please cite this article as: Wang, X.G., Feng, E.S., Jiang, C., A microplasticity evaluation method in very high cycle fatigue, *International Journal of Fatigue* (2016), doi: <http://dx.doi.org/10.1016/j.ijfatigue.2016.09.004>

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A microplasticity evaluation method in very high cycle fatigue

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Abstract:

This paper is concerned with an application of full-field calorimetric method for the microplasticity evaluation in the very high cycle fatigue regime. The employed method is essentially based on the establishment of an experimental energy balance during the fatigue process. It allows the estimation of the plastic strain of very low magnitude produced by cyclic slip, which is considered as the primary mechanism of the ultrahigh cycle fatigue in the face-centered cubic materials. By the developed method, the plastic strain amplitudes of a polycrystalline copper in the very high cycle fatigue regime are estimated, and its relationship with the fatigue lives is established via the Manson-Coffin law.

Keywords: Microplasticity; Very high cycle fatigue; Ultrasonic fatigue; Infrared thermography; Energy dissipation

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