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PII: S0142-1123(16)30362-0
DOI: http://dx.doi.org/10.1016/j.ijfatigue.2016.10.029
Reference: JIJF 4113

To appear in: *International Journal of Fatigue*

Received Date: 28 January 2016
Revised Date: 28 October 2016
Accepted Date: 31 October 2016

Please cite this article as: Bai, X., Xie, L., Zhang, R., Guan, R., Tong, A., Bai, E., Measurement and estimation of probabilistic fatigue limits using Monte-Carlo simulations, *International Journal of Fatigue* (2016), doi: http://dx.doi.org/10.1016/j.ijfatigue.2016.10.029

Measurement and estimation of probabilistic fatigue limits using Monte-Carlo simulations

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Abstract: Based on Monte-Carlo simulation, a new method is proposed to measure and estimate probabilistic fatigue limits, particularly for the situation with large scattering data. Firstly, the appropriate distribution was determined from four possible distributions by checking its consistency with the fatigue physics and checking its fit goodness. Then, the test procedure of this method was illustrated, which could use variable stress step sizes regardless of pairing observations. Finally, the method was applied to determine the fatigue limit of A7N01S-T4 aluminum. The results exhibited that this method was more flexible in test and could determine fatigue limit using fewer specimens.

Keywords: Fatigue limit; Fatigue test method; Large scattering data; Probabilistic analysis; Monte-Carlo simulation

1 Introduction

Fatigue limit is one of the most important material properties in many engineering designs. In general,

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