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**Multiaxial high-cycle fatigue life prediction model considering mean shear stress
effect under constant and variable amplitude loading**

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ABSTRACT: In this paper, load controlled uniaxial, pure torsion, constant and variable amplitude tension-torsion tests on 7075-T651 aluminum alloy tubular specimens were conducted. According to the analysis of the experimental data obtained, a multiaxial high-cycle fatigue life prediction model, based on the critical plane method and considering mean shear stress effect, is proposed. The critical plane is proposed to be determined by a weight average, which is based on the variation of the maximum shear stress. The estimated fatigue lives obtained by applying the proposed model, for the fatigue limits related to 10^6 , 2×10^6 and 10^7 cycles, are compared. The results demonstrate that the proposed model shows a good predictive capability.

Keywords: Fatigue experiments; High-cycle fatigue life prediction; Weight average method; Mean shear stress effect; Variable amplitude loading

NOMENCLATURE

σ applied stress tensor

t_k time instant or time point

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