

Acceleration factor and experimental validation of aluminum alloy under narrow-band random excitation

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Abstract

In order to reduce the vibration fatigue test time of aeronautical engineering components made of aluminum-alloy, a random vibration fatigue acceleration model under narrow-band excitation is proposed in this paper. A three-parameter $S-N$ curve is adopted to consider the effect of small stress response, while a scale factor a is introduced to consider the effect of stress distribution. The random vibration fatigue tests of 2024-T3 and 7075-T6 aluminum-alloy specimens with elliptical holes are performed, where the vibration fatigue lives of load spectra with the same bandwidth and different excitation acceleration levels are obtained. The test results show that the proposed model is in sound agreement with the test results.

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