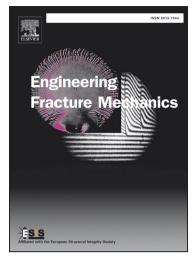
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Failure criterion of titanium alloy irregular sheet specimens for

vibration-based bending fatigue testing

Wei XU^{*} Xianfeng YANG Bin ZHONG Yuhuai HE Chunhu TAO

Aviation Key Laboratory of Science and Technology on Aeronautical Materials Testing and Evaluation, Beijing Key Laboratory of Aeronautical Materials Testing and Evaluation, Science and Technology on Advanced High Temperature Structural Materials Laboratory, Beijing Institute of Aeronautical Materials, Beijing 100095, China

Abstract

The failure moments of vibration-based fatigue tests are usually defined based on the natural frequency drops of specimens. But the selections-of-the-critical-values-of-the-frequency-drop-have-been-very arbitrary in the of lacking convincing previous tests, reasons. The-present-paper-aims-to-propose-a-failure

criterion-of-titanium-alloy-irregular-sheet-specimens-tested-in-a-vibration-based-bendi ng-fatigue-experiment.-A-novel-three-dimensional-finite-element-model-of-the-specime n-is-built,-with-a-cohesive-zone-model-employed-to-simulate-the-fatigue-dangerous-zo ne-(FDZ)-and-the-semi-elliptic-crack-propagation-process-of-the-specimen.-A-failure-c riterion-to-define-the-critical-natural-frequency-drop-is-subsequently-proposed-based-o n-the-obtained-computational-results.-Furthermore,-a-vibration-based-bending-fatigu e-test-for-the-specimens-is-conducted-to-verify-the-computational-model-and-the-prop osed-failure-criterion.-After-comparing-the-present-testing-results-with-the-results-of-a -similar-bending-fatigue-test,-the-two-types-of-the-testing-results-are-found-very-close. -The-vibration-based-bending-fatigue-test-with-the-proposed-failure-criterion-provides -an-effective-way-for-obtaining-accurate-fatigue-life-of-irregular-specimens.-

Keywords: Vibration-based fatigue; Titanium alloy; Cohesive zone model; Fatigue crack propagation; Failure-criterion

^{*} Corresponding author. Tel.: +86 10 62496728, fax: +86 10 62496733. *E-mail address:* wxu621@163.com (W. Xu).

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