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Fatigue Damage Evaluation by Use of "Smart Sensors"

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There is a need for an improvement in accuracy of forecasting of residual service life of commercially available aircraft components. Therefore, easy in use and precise non-destructive testing (NDT) methods for determination of the material fatigue are especially attractive. A basic understanding of structural changes during the fatigue damage process on different scaling levels is given by the physical Mesomechanics derived for a medium with local structure. The approach is based on the knowledge of the development of deformation structures (mesostructures) at three levels at the sample surface, micro/meso/macro-structure level, with increasing mechanical cyclic loading. The experiments for NDT detection of deformation structure were performed at AA2024 samples, which had special thin Al- single crystal films, the so-called "smart sensor" glued to their surfaces. For deformation structure detection the topography imaging microscopy and eddy current (EC) detection approach was used with the potential to transition this inspection to an aircraft for an in-situ solution for Structural Health Monitoring (SHM). Results of these investigations will be presented in the present contribution.

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Ключевые слова:

Содержание

Abstract
Introduction
Results
Conclusion
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