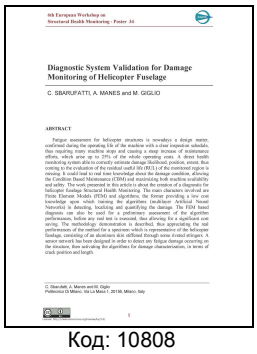

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Diagnostic System Validation for Damage Monitoring of Helicopter Fuselage

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Fatigue assessment for helicopter structures is nowadays a design matter, confirmed during the operating life of the machine with a clear inspection schedule, thus requiring many machine stops and causing a steep increase of maintenance efforts, which arise up to 25% of the whole operating costs. A direct health monitoring system able to correctly estimate damage likelihood, position, extent, thus coming to the evaluation of the residual useful life (RUL) of the monitored region is missing. It could lead to real time knowledge about the damage condition, allowing the Condition Based Maintenance (CBM) and maximizing both machine availability and safety. The work presented in this article is about the creation of a diagnostic for helicopter fuselage Structural Health Monitoring. The main characters involved are Finite Element Models (FEM) and algorithms, the former providing a low cost knowledge upon which training the algorithms (multilayer Artificial Neural Networks) in detecting, localizing and quantifying the damage. The FEM based diagnosis can also be used for a preliminary assessment of the algorithm performances, before any real test is executed, thus allowing for a significant cost saving. The methodology demonstration is described, thus appreciating the real performances of the method for a specimen which is representative of the helicopter fuselage, consisting of an aluminum skin stiffened through some riveted stringers. A sensor network has been designed in order to detect any fatigue damage occurring on the structure, then activating the algorithms for damage characterization, in terms of crack position and length.

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Ключевые слова:

Содержание