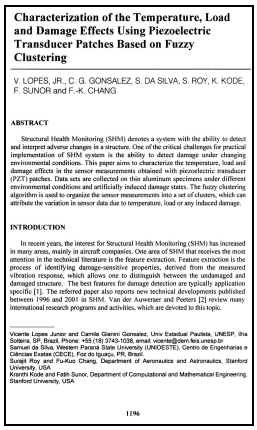

Characterization of the Temperature, Load and Damage Effects Using Piezoelectric Transducer Patches Based on Fuzzy Clustering

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ABSTRACT

Structural Health Monitoring (SHM) denotes a system with the ability to detect and interpret adverse changes in a structure. One of the critical challenges for practical implementation of SHM system is the ability to detect damage under changing environmental conditions. This paper aims to characterize the temperature, load and damage effects in the sensor measurements obtained with piezoelectric transducer (PZT) patches. Data sets are collected on thin aluminum specimens under different environmental conditions and artificially induced damage states. The fuzzy clustering algorithm is used to organize the sensor measurements into a set of clusters, which can attribute the variation in sensor data due to temperature, load or any induced damage.

INTRODUCTION

In recent years, the interest for Structural Health Monitoring (SHM) has increased in many areas, mainly in aircraft companies. One area of SHM that receives the most attention in the technical literature is the feature extraction. Feature extraction is the process of identifying damage-sensitive properties, derived from the measured vibration response, which allows one to distinguish between the undamaged and damaged structure. The best features for damage detection are typically application specific [1]. The referred paper also reports new technical developments published between 1996 and 2001 in SHM. Van der Auweraer and Peeters [2] review many international research programs and activities, which are devoted to this topic.

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Ключевые слова:

Содержание.