Title: Reliability Assessment of Structural Health Monitoring, Based on Transmittance Features

Authors: Rafik HADJRIA & Oscar D'ALMEIDA

Department: Safran Sensing System-Safran Tech

Abstract:

Commercial composite aerospace structure is required to be designed and life cycle managed under the damage tolerant principle, while the airworthiness is maintained through the process of scheduled inspection, and if needed repair or replacement. In that sense, the scheduled inspection of a structural component is addressed by visual and non-destructive inspection (NDI) techniques. However, this current practice accounts for more than 27% of the total cost of an aircraft, where this cost is mainly due to the high degree of human interaction and the fact that the structural components which are difficult to access have to be disassembled.

To reduce the maintenance cost, condition-based maintenance (CBM) concept has emerged in the Maintenance Steering Group-MSG3 (structural targets), where the health state of the structure is monitored using structural health monitoring (SHM) techniques.

To support effective deployment of SHM systems that effectively enable the transition to automatic inspection and CBM for composite aeronautical structures, SHM function must be subject to reliability assessment in detecting, locating and quantifying defects such as delamination. To this end, this paper will address the development of a statistical framework associated with an experimental methodology that access the detection of delamination in terms of probability of detection.

Keywords:

Structural health monitoring, Aerospace composite structures, Delamination flaws; Probability of detection curve, Hypothesis testing, Reliability assessment.

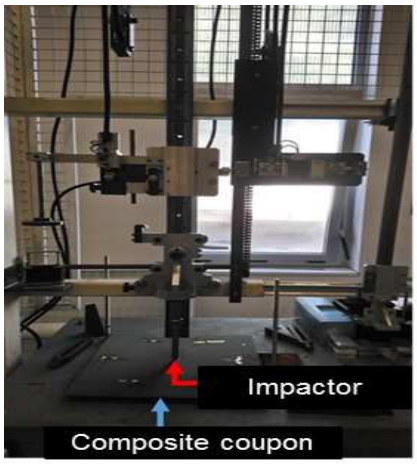

Figure 1: Test bench for impacting batch of monolithic composite coupons