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Space Structures I - Development and Verification (Space Vehicles and Components) (1)

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STRUCTURAL DIAGNOSIS USING AN EMBEDDED NON DESTRUCTIVE TESTING ULTRASONIC SOLUTION

Abstract

In line with the goal of reducing the cost of space launch, ESA and CNES (French national space agency) are engaged in a program aiming to develop the future European reusable space launchers. In this context, an embedded Non-Destructive Testing (eNDT) solution has been developed aiming to ensure that strategic parts of the launcher are free of damage before a new launch. A network of piezoelectric transmitters/receivers, embedded in the structure, allows to detect, localize and characterize potential structural damages. The technique is based on a comparaison between the pristine ultrasound signature of the structure and the deviation of a new ultrasound cartography from this reference. The performances of the system were first demonstrated on a honeycomb sandwich structure, specifically on a section of a payload adaptor, and tested for different damage types: hole, recess and crack. Finally, the robustness of the approach is evaluated regarding environmental conditions (temperature, vibrations).