



ULTRASONIC GUIDED WAVES FOR HEALTH MONITORING OF HIGH PRESSURE COMPOSITE TANKS

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ABSTRACT

Keywords: Guided waves, NDT, composite tanks.

Ultrasonic guided wave modes are proposed to control the integrity of high-pressure composite tanks produced by EADS - ASTRIUM, France. The purpose is to demonstrate the potentiality of air-coupled transducers to set-up a contact-less, single-sided technique for testing the moisture content and/or the micro-cracking of carbon epoxy composite wound around a Titanium liner, as well as to detect local disbonds between the composite and the liner. First of all, a laboratory experimental system and numerical tools are used to quantify the sensitivity of specific parameters (wavenumbers or attenuations) of some modes to the moisture content and to the micro-cracking in composite plate samples. These results are then used to set an experimental strategy for testing the carbon epoxy component of a high pressure composite tank, and the use of air-coupled transducers for generating-detecting sensitive wave modes is demonstrated. Secondly, the air-coupled system is employed for detecting a local disbond in the tank, simulated by a Teflon insert.

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