1.10.17. DETECTION OF WATER INSIDE CFRP/HONEYCOMB STRUCTURES BY A DOPPLER-RADAR DEVICE

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The request for the effective detection of water inside sandwich structures (CFRP/Nomex) is becoming more and more vital in the aerospace domain. The increasing use of CFRP parts in existing and new aircraft programs makes the search for an effective solution a central goal in the maintenance of such structures.

The paper describes the context of this development in the aerospace domain.

The initial concept validation and the mathematical modeling are described. This phase took place before the development of a prototype probe enabling the detection of water in a real structure. The probe is based in the emission and reception of an EM wave that is modulated by a mechanical frequency due to water displacement inside the honeycomb cell. The prototype describes the process of integration of the mechanical shaker, emitter and receiver antennas and the associated electronics enabling the easy observation of the spectral signature of the water in the cell.

Future developments are discussed such as the discrimination of liquids (kerosene, skydrol, water) in these structures.