TITLE: LOCAL ACOUSTIC RESONANCE SPECTROSCOPY: AN ESCALATION APPROACH FOR EFFICIENT NDT OF FIBER REINFORCED COMPOSITES

ABSTRACTS

Local acoustic resonance spectroscopy (LARS) is a non-destructive technique suitable for fast defect detection in large planar parts, especially in fiber composite structures. Applied in the acoustic frequency spectrum LARS is closely related to the coin tap test. In recent years, several applications in mechanical engineering have been established. These include the inspection of GFRP rotor blades as well as defect detection in CFRP parts in the automotive and aeronautic sectors. LARS is suitable for fast and therefore inexpensive measurements, also because it can be automated easily. For this, an automated tapping device for usage with a small industrial robot is developed in a student project. The objective of this system is to be able to scan plates of a maximum area of approx. 1m² using a roving impulse hammer and a capacitive microphone. Alongside experimental data, numerical simulation of the impulse response within the part is particularly useful to optimize the configuration on both the transmitting and receiving side for early identification of possible disturbances. After being detected by LARS, potential defect locations can then be more closely inspected by more complex non-destructive or destructive methods such as ultrasound. The general goal of this escalation approach is to reduce overall inspection effort.

KEYWORDS