

Highly-efficient and noncontact vibro-thermography via local defect resonance

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Abstract

A frequency match between the driving ultrasonic wave and characteristic frequency of a defect provides an efficient energy pumping from the wave directly into the defect (Local Defect Resonance (LDR)). Due to a strong resonance amplification of the local vibrations, the LDR-driven defects exhibit a high-Q thermal response and enable to implement frequency-selective thermosonic imaging with an opportunity to distinguish between different defects by changing the driving frequency. The LDR-thermosonics requires much lower acoustic power to activate defects that makes it possible to avoid high-power ultrasonic instrumentation and even proceed to a remote ultrasonic thermography by using air-coupled ultrasonic excitation.

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