

Laser-Ultrasonic Method for Measuring the Local Elastic Moduli of Porosity Isotropic Composite Materials

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Abstract : The laser-ultrasonic method is realized for quantifying the influence of porosity on the local Young's modulus of isotropic composite materials. The method is based on a laser generation of ultrasound pulses combined with measurement of the phase velocity of longitudinal and shear acoustic waves in samples. The main advantage of this method compared with traditional ultrasonic research methods is the efficient generation of short and powerful probing acoustic pulses required for reliable testing of ultrasound absorbing and scattering heterogeneous materials. Using as an example samples of a metal matrix composite with reinforcing microparticles of silicon carbide in various concentrations, it is shown that to provide an effective increase in Young's modulus with increasing concentration of microparticles, the porosity of the final sample should not exceed 2%.

Keywords : laser ultrasonic, longitudinal and shear ultrasonic waves, porosity, composite, local elastic moduli

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