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Laser Ultrasonic Inspection System Based on Optical Multi-Channel Interferometer

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We proposed and developed two novel techniques of multi-channel laser ultrasonic defectoscopy for industrial application. They are based on and adaptive interferometers of two types: i) using refraction dynamic holograms and ii) photo-electromotion force (photo-EMF) in semiconductor crystals. In our approach acoustic waves in samples are produced by the pulsed laser beam generated with cylindrical optics and thus being cross-shaped in the form of a narrow strip. Such a form of a laser beam enables to excite shear and longitudinal bulk acoustic waves with cylindrical wavefront. In the case of defects and inhomogeneties contained within a sample volume the scattered acoustic waves arise, which cause additional vibrations of the sample surface; the phase of these vibrations in each point of the sample surface depends on the location of scattering defects. The registration of amplitude and phase of surface displacement caused by defects is made in the local areas situated symmetrically relatively to the region of laser ultrasound excitation. In the device prototype from two to four pairs of local areas are analyzed.

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Ключевые слова:

Содержание