

Annotation

Probe beam diffraction correction for laser-ultrasonic material evaluation

This paper discusses the problems associated with the use of laser-ultrasonic structuroscopy for the purpose of detecting defects in materials and measuring the longitudinal sound velocity, namely the diffraction divergence of the probe beam.

In used methodology of materials research it is important to record the time of registration came to the receiver scanning pulses, which is determined by the position of the peak of pulse. However, spreads in the material ultrasonic pulse is influenced by diffraction, and its maximum is shifted from the original position (on the coordinate axes of the running time), thus making an error in the measurement of material parameters.

The purpose of this work is not only a review of compensation methods of probing beams diffraction, but also the development of an experimental algorithm for the recovery and creation of a special program, which allows to process the signals of laser-ultrasonic detector, and to compensate for diffraction beams, thereby increasing measurement accuracy. This program is written in the LabView, demonstrates the efficiency of the proposed algorithm. Testing of the algorithm and its verification is carried out by using a model gaussian pulse, and different methods of recording the signal.

With established programs conducted compensation of signals of laser ultrasonic detector and defined measurement error of ultrasonic velocity introduced by the diffraction of the ultrasonic beam, for different materials.