Acoustic waves loss in Al-7075-T6 and St 304

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Abstract
Propagation and dispersion of acoustic waves is one of the important phenomena in physics. Acoustic-waves are nowadays widely used in a variety of applications ranging from underwater communications, identification and specification of the internal defects of materials to extracorporeal shock wave lithotripsy. Apart from application and utilization of such phenomena, study on production and propagation of acoustic waves have a special importance. This paper is focused on the experimental and the analytical investigation of acoustic-waves loss in metallic materials. Firstly, the governing differential equations of the acoustic waves propagation are derived and solved for a damped cylindrically shaped rod. With regard to boundary and initial conditions, the equation and the curve of damped acoustic wave displacement are obtained. By using experimental modal techniques, experimental investigations on the energy loss and the extraction of damping coefficients of acoustic waves are done. The experimental information obtained from experimental tests such as Frequency Response Function, the formula and the curve of the energy loss versus frequency are extracted. Selected metallic materials for the experimental set-ups are two specimens of steel and aluminum.

Keywords: acoustic-waves, experimental modal analysis, frequency response function, vibrational damping of metallic materials

For full article, refer to the Persian section.