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MODELING OF ELECTROMAGNETIC-ACOUSTIC CONVERSION WHEN EXCITED TORSIONAL WAVES

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Abstract

Physical and mathematical model of the process of transformation of electromagnetic energy into acoustic energy in the hollow ferromagnetic rod circumferentially magnetized by permanent polarizing magnetic field designed in the form of differential equations. With the help of the Fourier integral the general solution of the inhomogeneous differential equation for torsional mode of traveling waves was solved. The contribution of the stiffness of the rod magnetized in the intensity of the excited acoustic field was estimated. In the model example frequency characteristics of electromagnetic - acoustic conversion were investigated and explained. The relationship between the geometric parameters of the converter model and product properties of the material with the amplitude of the excited torsional waves at a given frequency was discovered. The research results can be used in the energy, nuclear, chemical and other industrial areas appropriate for ultrasonic inspection of tubular products. References 11, figures 5.

Key words: torsional wave, electromagnetic - acoustic conversion, the tubular article, the wave converter characteristic.

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