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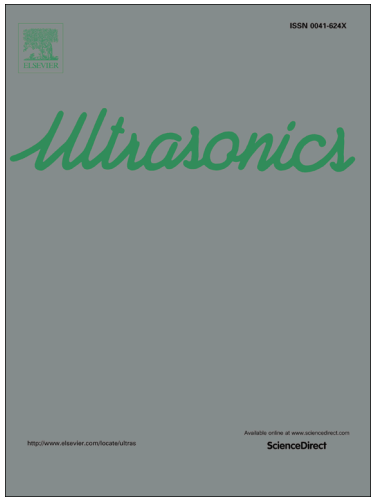

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Lamb waves propagation in layered piezoelectric/piezomagnetic plates

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Abstract

A dynamic solution is presented for the propagation of harmonic waves in magneto-electro-elastic plates composed of piezoelectric $BaTiO_3$(B) and magnetostrictive $CoFe_2O_4$(F) material. The state-vector approach is employed to derive the propagator matrix which connects the field variables at the upper interface to those at the lower interface of each layer. The ordinary differential approach is employed to determine the wave propagating characteristics in the plate by imposing the traction-free boundary condition on the top and bottom surfaces of the layered plate. The dispersion curves of the piezoelectric–piezomagnetic plate are shown for different thickness ratios.The numerical results show clearly the influence of different stacking sequences as well as thickness ratio on dispersion curves and on magneto-electromechanical coupling factor. These findings could be relevant to the analysis and design of high-performance surface acoustic wave (SAW) devices constructed from piezoelectric and piezomagnetic materials.

Keys Words: Wave propagation; Laminated piezomagnetic/piezoelectric plates; Dispersion curve; State space approach.

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