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Theory of magnetoelectric coupling in magnetostrictive-piezoelectric bilayer at bending modes[1] A.V. FILIPPOV, N.A. FEDOTOV, M.I. BICHURIN, V.M. PETROV, Novgorod State Univ., Russia, G. SRINIVASAN, Oakland Univ., MI, CE-WEN NAN, Tsinghua Univ., China — Magnetoelectric (ME) couplings in bilayers of magnetostrictive and piezoelectric phases result from mechanical deformation. Reports to-date focused mainly on enhancement of the ME effect in the electromechanical resonance (EMR) corresponding to radial modes. Recent investigations, however, showed a similar enhancement and a giant ME effect for the bending modes of EMR in ferromagnetic-piezoelectric layered structures. Such bending modes are expected to occur at a much smaller frequencies than radial modes. Here we provide the frequency dependence for longitudinal and transverse ME voltage coefficients using a simultaneous solution of electrostatic, magnetostatic and elastodynamics equations. The resonance ME effect in a bilayer is shown to be strong, depending on boundary conditions. A giant ME coefficient for bending modes is predicted for a bilayer fixed at one end and free at the other. The ME voltage coefficients are estimated from known material parameters (piezoelectric coupling, magnetostriction, elastic constants, etc.) and are compared with data.

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