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Resonance enhancement of magnetoelectric coupling in ferrite-piezoelectric bilayer at bending and shear vibrations U. LALETSIN, V.M. PETROV, G. SRINIVASAN, Oakland University, Rochester, MI, M.I. BICHURIN, D.A. FILIPPOV, Novgorod State University, Russia, CE-WEN NAN, Tsinghua University, China — Magnetoelectric (ME) couplings in bilayers of magnetostrictive and piezoelectric phases are mediated by mechanical deformation. We discuss here the theory and experiments on ME interactions in a ferrite-lead zirconate titanate (PZT) bilayer at frequencies corresponding to bending and shear modes of electromechanical resonance (EMR). Excitation conditions for bending and shear vibrations of a bilayer are considered. Estimated ME voltage coefficients versus frequency profiles for nickel ferrite or cobalt ferrite and PZT show a giant ME effect at EMR with the highest coupling expected for cobalt ferrite-PZT. Measurements of resonance ME coupling have been carried out on layered composites of nickel ferrite-PZT. We observe the expected increase in ME voltage coefficient at EMR. Theoretical ME voltage coefficients versus frequency profiles are in excellent agreement with data. The research was supported by grants from the NSF (DMR-0606153; NIRT-0609377; ECCS-0621907).

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