Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Laminated magneto-electric structures for tunable contactless magnetic sensing and energy harvesting PETER FINKEL, NUWC — Multiferroic materials attracted increasingly high attention due to their potential in various multifunction sensing, filtering and energy transduction applications. In this work we investigated the magnetoelectric laminated multiferroic structure exhibiting a strong magneto-electric (ME) effect. We report here the magnetetoelctric coupling properties of the magnetoelastic/piezoelectric laminated FeNi42%/ polyvinylidene fluoride (PVDF) clamped composite structure as a function of stress and magnetic field. The magnetically and elastically tunable, flexural resonant mode was probed using Doppler laser spectroscopy. Most commercially available methods of magnetic sensing involve electrical current or voltage measurements requiring electrical wiring or similar contact connections to measure an electric signal correlated with a magnetic field; and therefore are not immune to EMI and shot-noise. Our solution could overcome this shortcoming is to implement a completely remote contactless, i.e. optical, measurement approach. Here we demonstrate that this bimorph structure can be used for low-frequency contactless detection of magnetic field fluctuation and magnetic field monitoring for non-contact resonant optical magnetic field sensing and energy harvesting.

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Date submitted: 01 Dec 2009 Electronic form version 1.4