

Abstract Submitted  
for the MAR08 Meeting of  
The American Physical Society

**Microwave** **Magnetolectric**  
**Coupling in Ferromagnetic-Piezoelectric Nanostructures**<sup>1</sup> YU.J. PUKIN-  
SKY, M.I. BICHURIN, V.M. PETROV, A.V. FILIPPOV, S.V. BELY, Novgorod  
State Univ. Russia, G. SRINIVASAN, Oakland Univ., MI — A theory is presented  
on the effect of an external electric field on ferromagnetic resonance (FMR) spectra  
of nanobilayers, nanopillars and nanowires of ferrite and piezoelectrics on MgO or  
gadolinium gallium garnet substrates. Expressions have been obtained relating the  
FMR line shift to ME coupling constants. Estimates of ME coupling constants are  
given. With increasing substrate thickness, the theory predicts a decrease in the ME  
interaction due to the clamping effect. The strongest ME coupling is expected for  
ferrite nanopillars in a piezoelectric matrix when the pillar height is large compared  
to substrate thickness. Numerical estimations are obtained for nanostructures of  
nickel ferrite and PZT or PMN-PT, yttrium iron garnet and PZT or PMN-PT on  
MgO or gadolinium gallium garnet substrates. The theory is useful for measure-  
ments of ME constants and for the design and analysis of electrically controlled high  
frequency devices.

<sup>1</sup>Supported by grants from NSF, Russian Foundation for Basic Research and Russian  
Ministry of Education and Science.

G. Srinivasan  
Oakland Univ.

Date submitted: 19 Nov 2007

Electronic form version 1.4