

Strain modulated microwave spectroscopy as a sensitive method to study mechanisms responsible for spin-lattice coupling in ferromagnets

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We have developed a new method of measuring magnetostriction constants (or components of magnetoelastic tensor) of ferromagnetic thin films. This method is based on the fact that the frequencies of ferromagnetic resonance and spin wave resonance are stress dependent. The character of this dependence is determined by the magnetoelastic tensor components and it may be used to calculate their magnitude. In our previous papers (see [1] and references therein) the strain modulated ferromagnetic resonance was used to evaluate magnetostriction of thin ferromagnetic films. Unfortunately, using this method only one-ion contribution to the magnetostriction constant may be determined since this method is not sensitive to two-ion contribution. Generally, it is not easy to determine this contribution for thin magnetic films. It seems that the most effective way to solve this problem is to measure strain modulated spin wave resonance and to compare it with magnetic field modulated spin wave resonance. An illustrative example will be given and discussed.

References:

[1] K. Nesteruk, R. Zuberek, S. Piechota, M.W. Gutowski and H. Szymczak *Meas. Sci. Technol.* 25 (2014) 075502

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