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Mechanical readout of ferromagnetic resonance via the Wiedemann effect[1] SUNG UN CHO, MYUNG RAE CHO, SEONDO PARK, YUN DANIEL PARK, Department of Physics Astronomy, Seoul National University, Seoul 08826, Korea — We demonstrate a mechanical readout method of ferromagnetic resonance (FMR) as coupled to the mechanical flexural mode of a Py(NiFe)/Pt bilayer strip. Magnetoelastic interaction between the longitudinal and torsional strain arising from the Wiedemann effect [1] manifests as dispersive shifts of mechanical resonance frequencies sympathetic to FMR. Under external magnetic field, rf-current is applied through the mechanical beam to drive magnetization precession and piezoresistivity of Pt enables the mechanical resonance measurement in all electro-mechanical manner at room temperature [2]. We also characterize the FMR using spin-torque FMR measurement technique [3] which well follows the Kittel formula. Additionally, spin-transfer torque contribution to the mechanical reaction by spin Hall effect in the Pt layer is discussed with our numerical expectation. Our all electro-mechancial scheme guarantees the scalability to downscale for low power driving of FMR and is suitable applying nano-scale spintronics architecture for realization of integrating circuit. [1] G. Wiedemann, Annalen der Physik 179, 563-577 (1858). [2] H. Bhaskaran et al., Appl. Phys. Lett. 98, 013502 (2011). [3] L. Liu et al., Phys. Rev. Lett. 106, 036601 (2011).

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