# Generation of Angular Momentum and Dynamical Coupling in Ferromagnetic Nanolayers

***A. R. Koymen[1*], S. Demirtas[2], and M. B. Salamon[2]***

*[1]Department of Physics, University of Texas at Arlington, Arlington, TX 76019, USA*

*[2]Department of Physics, University of Texas at Dallas, Richardson, TX 75083, USA*

The generation and detection of spin currents remains a major focus of research in magnetism. In thin film and multilayer magnets, the emphasis has been on static spin currents and their ability to create spin torques. However, it is also possible to transfer angular momentum to the conduction electrons using ferromagnetic resonance (FMR) as the driving mechanism. The temperature dependent dynamic magnetic properties of rare earth (Gd, Tb, and Sm)/Ag/transition metal (Fe, Co, Ni and Py) trilayers were investigated by FMR. The FMR linewidth of Fe and Co increases with decreasing temperature, a signature of torque-dominated processes, while those of Ni and Py are relatively temperature independent, suggesting competition between spin- and torque-dominated relaxations. It was also found that Fe and Co among transition metals (TM) show narrower magnetic resonance linewidths in rare earth (RE)/Ag/TM/Ag thin film trilayers compared to the values for Ag/TM/Ag, while Ni and Py in the trilayer films show equal or larger linewidths. We attribute this behavior to the relative contributions of intraband and interband scattering to the FMR damping parameter. The Y/Ag/ (Fe, Co) trilayers seems not to change the resonance linewidth from the original value, suggesting that the magnetic moments for the f-electrons play a significant role in reducing damping.