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Time resolved optical studies of coherent spin waves in Fe/AlGaAs (001) HAIBIN ZHAO, DIYAR TALBAYEV, QIGUANG YANG, GUNTER LUEPKE, Department of Applied Science, College of William and Mary, Williamsburg, VA, 23185, AUBREY HANBICKI, CONNIE LI, OLAF VAN'T ERVE, GEORGE KIOSEOGLOU, BERRY JONKER, Naval Research Laboratory, Washington, DC, 20375 — Coherent magnetization precessions are generated by ultrafast optical excitation in epitaxial Fe films grown on AlGaAs (001) over a wide range of applied magnetic fields. In a 10-nm thick Fe film, uniform magnetization precessions are excited along the in-plane easy axis [100], as well as along the hard axis [1-10]. At low excitation, the magnetic anisotropy constants and damping parameters are determined from the temporal evolution of the coherent magnetization precession. Standing spin waves as well as uniform precession are excited in a 50-nm thick Fe film, allowing simultaneous determination of anisotropy constants and exchange coupling stiffness. The comparison of spin wave strength between the two films reveals the significant influence of uniaxial magnetic anisotropy on the transient magnetic torque. This might be useful to achieve precession switching in nanomagnets where the uniaxial anisotropy is dominant.

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