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Time-resolved Kerr effect in $SrRuO_3$: observation of oscillatory dynamics M. LANGNER, C.L.S. KANTNER, C.P. WEBER, J. ORENSTEIN , L.W. MARTIN, R. RAMESH, UC Berkeley and Lawrence Berkeley National Lab — We report measurements of magnetization dynamics in thin films of the perovskite transition metal oxide $SrRuO_3$, a metallic compound that is ferromagnetic below approximately 150 K. The dynamics of the magnetization vector, $\overrightarrow{M}$, were measured using the time-resolved magneto-optic Kerr effect. In this technique a pump laser pulse, at photon energy 1.5 eV, perturbs the magnet by reducing the magnitude of $\overrightarrow{M}$ and changing the direction of the anisotropy field. The subsequent dynamics of $\overrightarrow{M}$ are measured by detecting the rotation of the plane of polarization of a time-delayed probe beam that is reflected from the surface of the sample. Below $\sim$ 100 K, we observe a damped oscillation in the Kerr rotation with frequency 250 GHz. The damping decreases with decreasing temperature down to $\sim$ 50 K and remains constant below this temperature. We tentatively identify this oscillation as the q=0 magnon, or ferromagnetic resonance frequency (FMR), of SrRuO3. The rather large value of the FMR frequency is consistent with the known large magnetocrystalline anisotropy of this compound. We will report measurements of $\overrightarrow{M}$(t) as a function of film thickness, residual resistance, and orientation of crystalline axes.

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