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Strain-dependent magnetization dynamics in $La_{0.67}Sr_{0.33}MnO_3$ studied by time-resolved magneto-optical Kerr effect DIYAR TALBAYEV, HAIBIN ZHAO, GUNTER LÜPKE, The College of William and Mary, JUN CHEN, QI LI, Pennsylvania State University — We observed the uniform magnetization precession in the ferromagnetic state of $La_{0.67}Sr_{0.33}MnO_3$ films grown on different substrates. The precession was induced by an optical pump pulse and probed by a time-delayed pulse using the Kerr rotation. We recorded the time-evolution of magnetization in the 50-300 K temperature range in magnetic fields of up to 1.3 T. The field dependence of the precession frequency was found to follow the predictions of Kittel's mean field theory, and the frequencies agree with those recorded in microwave absorption experiments. The observed precession frequencies depend on the film substrate, and thus on the amount of strain induced in the film. To account for the strain differences, we introduce the magnetic anisotropy that ranges from easy plane to easy-out-of-plane axis. Precession frequencies displayed no or very little temperature dependence. The field-dependent relaxation times of the exponentially decaying precession are in 100 – 1400 ps range. The corresponding Gilbert damping parameter decreases with increasing field and is about 0.0003 for all studied temperatures. The research was supported in part by the National Science Foundation and the Department of Energy.

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