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Optically-induced coherent spin precession in manganite superlattices[1] HAIBIN ZHAO, KEVIN SMITH, GUNTER LUEPKE, College of William and Mary — The artificial perovskite superlattices composed of $LaMnO_3$ (LMO) and $SrMnO_3$ (SMO) have been investigated to elucidate the interface ferromagnetic order created by adjoining the two antiferromagnetic Mott insulators. Optically-induced coherent spin precessions are studied by time-resolved magneto-optical Kerr effect in a superlattice composed of 4 u. c. (unit cells) LMO and 2 u. c. SMO for a total of 13 double-layers grown on a single-crystalline (001) substrate of $SrTiO_3$ (STO). We found that the demagnetization field and the anisotropy field are very similar in the LMO/SMO superlattice (H_d = 0.75 T, H_a = -0.14 T) and in a $La_{0.67}Sr_{0.33}MnO_3$ thin film (H_d = 0.72 T, H_a = -0.2 T) both grown on STO substrates indicating that the strain and magnetic character are very similar in the two manganite structures. However, the low field precession behavior is distinctly different which shows that pinning by antiferromagnetic spins in the LMO layers and/or surface anisotropy of the superlattice may contribute significantly to the effective field at low applied fields, thus modifying the mode profile and precession frequency. We will discuss this exchange interaction in LMO/SMO superlattices with different periods in zero-field cooling and field cooling.

[1]The samples were synthesized by Dr. A. Bhattacharya (Argonne).

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