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Non-Collinear Spin Structures in $LaNiO_3/La_{2/3}Sr_{1/3}MnO_3$ Superlattices JASON HOFFMAN, Argonne National Laboratory, BRIAN KIRBY, National Institute of Standards and Technology, ANAND BHATTACHARYA, Argonne National Laboratory — The exchange coupling between magnetic layers separated by non-magnetic spacers can give rise to spin structures that are distinct from those observed in the bulk constituents. In this work, we investigate a non-collinear spin arrangement in superlattices containing paramagnetic $LaNiO_3$ and ferromagnetic $La_{2/3}Sr_{1/3}MnO_3$. We use molecular beam epitaxy, to fabricate a series of $(LaNiO_3)_n/(La_{2/3}Sr_{1/3}MnO_3)_9$ superlattices on (001) $SrTiO_3$ and LSAT substrates, where n is varied between 1 and 9 unit cells. The total thickness of the superlattices is kept constant at 60 nm by varying the number of superlattice repetitions. The magnetic structure of the superlattices was investigated as a function of temperature and in-plane magnetic field using polarized neutron reflectometry. We find the magnetization of neighboring $La_{2/3}Sr_{1/3}MnO_3$ layers to be non-collinear at low fields due to an antiferromagnetic interlayer exchange coupling, which persists to temperatures above 250 K. We discuss underlying mechanisms for the observed behavior and possible applications to oxide-based magnetoresistive devices.

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