Asymmetric and modulated magnetic profiles in (LaMnO$_3$)$_{2n}$/(SrMnO$_3$)$_n$ superlattices$^1$ S.J. MAY, S.G.E. TE VELTHUIS, MSD, Argonne National Laboratory, M.R. FITZSIMMONS, Los Alamos National Laboratory, A.B. SHAH, J.M. ZUO, X. ZHAI, J.N. ECKSTEIN, University of Illinois, Urbana-Champaign, S.D. BADER, A. BHATTACHARYA, MSD and CNM, Argonne National Laboratory — We have determined the magnetic depth profile of MBE-grown ferromagnetic (LaMnO$_3$)$_{2n}$/(SrMnO$_3$)$_n$ superlattices, where $n$ is nominally equal to 3 and 5. Polarized neutron reflectivity measurements reveal the existence of a modulated magnetic structure that repeats with the superlattice period in both samples. For $n=5$, a moment of $\sim 2.6 \mu_B$/Mn is measured in the LaMnO$_3$ (LMO) layer, while the moment in the middle of the SrMnO$_3$ (SMO) layer is negligible. The magnetization at the interfaces is found to be asymmetric with an enhanced moment residing at the LMO/SMO interfaces but not at the SMO/LMO interfaces. The origin of the magnetic asymmetry at the interfaces is elucidated from comparison with the structural properties determined by x-ray reflectivity and transmission electron microscopy.

$^1$Supported by the U.S. Department of Energy (DOE), Office of Basic Energy Sciences under contract DE-AC02-06CH11357.