Numerical Study of the Ground State of the $BiFeO_3$/(La,Sr)MnO_3 Interface

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The contact between a ferromagnetic metal and an antiferromagnetic insulator induces interesting physics near the interfaces of metal oxide heterostructures. In this work, the ground state properties of the $La_{0.75}Sr_{0.25}MnO_3$ and $BiFeO_3$ (LSMO/BFO) heterostructures are studied using a two-orbital double-exchange model including a finite superexchange coupling and the effect of Jahn-Teller phonons. In order to describe the charge transfer through the interface, the long-range Coulomb interaction has been taken into account at the mean-field level, by self-consistently solving the Possion's equation. Interestingly, an orbital ordered state is induced near the interface of the heterostructure due to symmetry breaking at the interface. A spin-flop state is also found to be stabilized at the interface. The connection between this state and the possible exchange bias effect in the LSMO/BFO heterostructure is discussed.