Abstract

The half-metallic materials having complete spin polarization are extensively studied in view of their potential spintronics applications based on magnetoresistance effects. The ferromagnetic double perovskite compound Sr_2FeMoO_6 is considered as one of the most important materials -because of its high Curie temperature (Tc=450K) and complete spin polarization- to understand the role of electronic parameters controlling the half-metallic ground state in double perovskites. We present an electronic approach using the Green's function technique and the renormalization perturbation expansion method to study the electronic, magnetic and thermodynamic properties of double perovskites. The model is based on a correlated electron picture with localized Fe spins and conduction Mo electrons interacting with the local spins via a double-exchange-type mechanism. Our results show the influence of the electronic correlation on the density of states and the thermodynamic properties, particularly the behavior of the Tc as a function of the conducting electrons.