Magnetotransport Properties in Manganite La1/3Ca2/3MnO3 (FM) and La2/3Ca1/3MnO3 (AF): A Monte Carlo Approach

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Manganese perovskites have recently been the focus of renewed interest, due to the "colossal" magnetoresistance (CMR) effect and the coupled metal-insulator and magnetic transitions displayed at the spin-ordering temperature TC by some of these compounds. In this work, a magnetotransport properties simulation of ferromagnetic (FM) La2/3Ca1/3MnO3 and antiferromagnetic (AF) La1/3Ca2/3MnO3 is presented and discussed. Our study is addressed by using the Monte Carlo method. Moreover, magnetic Kronig-Penney model based on the thermodynamics of a Heisenberg can be used for describing the colossal magnetoresistance (CMR) phenomenon for the FM phase and insolating behavior for the AF phase. The model consists on tunnelinglike transmission process of hopping electrons in a magnetically dynamic lattice containing magnetic clusters. In this model, electrical transport features are meanly governed by the magnetic states, neglecting the lattice strain effects. By means of the theoretical fundaments described here, intrinsic temperature and field dependences of the resistivity and magnetoresistance, typically observed in these manganites were obtained and analyzed.