Rules of formation of charge and magnetic order in the generalized Falicov-Kimball model with Hund coupling

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Charge and spin ordering are studied on the simplest 1D and 2D square lattice within the generalized Falicov-Kimball model with Hund coupling between localized and itinerant electrons and Coulomb type repulsion between localized electrons. Using the restricted phase diagrams method (RPDM) a number of simple rules of formation of various sorts of ground state phases have been detected. It appears that both a period and a kind of arrangement of charge and spin inside a unit cell are primarily determined by the density of moving electrons. In 2D in the mixed valence regime only axial stripes (vertical or horizontal) have been found for intermediate values of the coupling constants. They are composed of ferromagnetic or antiferromagnetic chains interchanged with non-magnetic ones. And phases located along the diagonal $\rho_f = 1 - \rho_d/2$ have the most homogenous distribution of charge. After including the Coulomb type coupling between localized electrons located on neighboring sites the distribution of phases appearing in the phase diagram changes in that way, that more periodic phases occur on the right hand side of the line $\rho_f = \frac{1}{2}\rho_d$ and less on the left hand side of that line.

9.7 cm

13.4 cm

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