Ground-State Ferromagnetism in a model with Anderson-Hubbard centers

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Ferromagnetic ordering stabilization is studied within a model of narrow energy band hybridized with energy levels of electrons localized on Anderson-Hubbard centers. Besides the spin-spin interactions and strong on-site Coulomb interaction, due to hybridization, the indirect hopping and indirect exchange interactions are pronounced in the model. Configurational representation of Hamiltonian with X-operators describing the localized spin subsystem has been built. On this base the effective Hamiltonian has been constructed for the case of strong Coulomb correlation and classification of effective exchange and effective hopping parameters within the model has been proposed. Criteria for the ferromagnetic ordering stabilization have been found for low-temperature strongly correlated regime. Ground state energy and zero-temperature magnetization of the localized spin subsystem has been calculated. Analytical solution for magnetization as a function of the effective bandwidth, electron concentration and model parameters obtained in zero-temperature limit with rectangular bare density of states indicate that the ferromagnetic ordering can be stabilized by the hybridization through the mechanism of effective exchange interaction. The region of electron concentrations favorable for low-temperature ferromagnetic phase stabilization depends substantially on hybridization-to-intra-cite correlation ratio.