

## **Ferromagnetism in spin subsystem hybridized with conduction band in Anderson-Hubbard-type model**

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Magnetic ordering mechanisms in spin subsystem of an analogue of Anderson-Hubbard model [1] have been studied. Besides the spin-spin interactions and strong on-site Coulomb interaction, the model takes into account the hybridization with conduction band which results in the indirect hopping and indirect exchange interaction. Configurational representation of Hamiltonian with Hubbard 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. Magnetization of the localized spin subsystem has been calculated. Our results show that in the considered model the effects of localization are enhanced due to reduced values of indirect hopping integrals in comparison with standard s-d-model. For the ground state in the case of rectangular bare density of states the analytical solution for magnetization as a function of the effective bandwidth, electron concentration and model parameters has been obtained. Criteria for the ferromagnetic ordering stabilization have been found for arbitrary temperatures. Curie temperature for the system with Anderson-Hubbard centers has been calculated numerically for wide range of electron concentrations in different correlation regimes. For the particular case of weak effective exchange, the formula for the Curie temperature reproducing the well-established results has been calculated analytically. It is worth to note that the obtained values of Curie temperature are proportional to conduction band width, though the ferromagnetic ordering is stabilized by the indirect exchange interaction. The region of electron concentrations favorable for ferromagnetic ordering stabilization depends substantially on hybridization through effective exchange integral.

- [1] V.Yu.Irkhin and Yu.P.Irkhin. *Electronic Structure, Correlation Effects and Physical Properties of d- and f- Metals and their Compounds*. Cambridge International Science Publishing, 2007.