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Time evolution of excited state in the system with first-order metal-insulator transition W. KOSHIBAE, Cross-Correlated Materials Research Group (CMRG), RIKEN, CREST, JST, N. FURUKAWA, Aoyama-Gakuin Univ., ERATO-Multiferroics, JST, c/o Dept. of Appl. Phys., Univ. of Tokyo, N. NAGAOSA, CMRG, RIKEN, Dept. of Appl. Phys., Univ. of Tokyo — We have studied numerically the relaxation process in the system with a first-order metal-insulator transition using the double-exchange model: $H = -t\sum_{<ij>,\sigma}\left(c^{\dagger}_{i\sigma}c_{j\sigma}+h.c.\right) - J_H\sum_i\left(\vec{\sigma}_{\alpha\beta}c^{\dagger}_{i\alpha}c_{j\beta}\right)\cdot\vec{S}+J\sum_{<ij>}\vec{S}_i\cdot\vec{S}_j$. The localized spin is considered to be a classical vector with a magnitude S. In the two dimensional system and in the case that $SJ_H/t<4$, the ground state shows a metal-insulator transition due to the change of the magnetic state. When the magnitude of the parameter S^2J/t is not large enough, the antiferromagnetic insulating state is stabilized because of a perfect nesting-condition of the system. The metallic state appears with the ferromagnetic state. We have numerically investigated the time evolution of the coupled electronic and spin states by combining the exact diagonalization and the Landau-Lifschitz-Gilbert equation. Due to the effect of the Gilbert dumping, the excited electronic state goes back to the ground state. In the light of the theoretical results, we will discuss the relaxation process and cross-effects in the system with a first-order metal-insulator transition.

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