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Ultrafast photo-induced spin and charge dynamics in correlated electron system SUMIO ISHIHARA, YU KANAMORI, Department of Physics, Tohoku University, HIROAKI MATSUEDA, Sendai National College of Technology — Photo-induced phenomena in correlated electron system are one of the attractive themes in recent solid state physics. One of the well known examples is manganites with the perovskite crystal structure. The charge ordered insulating state associated with the antiferromagnetic (AFM) long-range order competes with the ferromagnetic metallic phase. After introduction of the pump photon into the charge-ordered insulating phase, dramatic changes in the optical reflectivity and in the optical Kerr rotation are observed. These results imply that the charge and magnetic structures are changed cooperatively by the photo-irradiation. We present a theoretical study of photo-induced dynamics in a correlated electron system where electronic charge couples with spin and lattice. The generalized double exchange model is analyzed by utilizing the two complementary methods, the exact diagonalization and inhomogeneous Hartree-Fock methods. Time evolutions of the optical absorption spectra, spin correlation, and charge correlation are calculated. There are two time scales in the photo-induced dynamics; the charge and AFM spin orders are collapsed within a short time scale corresponding to 10-100 fs, and the long-range FM spin correlation appears in a long time scale corresponding to a few ps.

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