Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Real-time dynamics in electron-lattice coupled system: Numerical study on an extended double-exchange model WATARU KOSHIBAE, CMRG, RIKEN, NOBUO FURUKAWA, Aoyama-Gakuin Univ., NAOTO NAGAOSA, Dept. of Appl. Phys., Univ. of Tokyo, CMRG, CERG, RIKEN — We have developed a new theoretical method to study the photo-induced insulator-to-metal (IM) transition in strongly correlated electron systems [PRL **103**, 266402 ('09); EPL **94**, 27003 ('11).]. In the manganese oxides, it has been observed that the photo-induced dynamics with several tens of THz in frequency can drive IM transition [Nature Materials **6**, 643 ('07).]. The excitation energy with several tens of THz in frequency is fairly lower than the insulating energy gap of the electronic state. In this study, we introduce an extended double exchange model where the conduction electron couples with the orbital-ordering field and lattice distortion, and numerically examine the lattice vibration induced IM transition in the electron-lattice coupled system. To simplify the numerical calculation, the electronic states are restricted in the Hilbert space for perfect ferromagnetic states involving the ground state. In the numerical simulation, we find that the low frequency vibration of Jahn-Teller distortion can change the orbital-ordering pattern and trigger the IM transition. A threshold behavior of the lattice-vibration induced IM transition and the electron-hole excitation by continuous forced lattice-vibration are also examined.

Wataru Koshibae
CMRG, RIKEN

Date submitted: 25 Oct 2012 Electronic form version 1.4