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Charge dynamics in a frustrated charge ordered multiferroic system MAKOTO NAKA, SUMIO ISHIHARA, Department of Physics, Tohoku University — Electronic ferroelectricity is known as phenomena where the electric polarization is caused by the electronic charge order without inversion symmetry. This is seen in some transition metal oxides, e.g. $LuFe_2O_4$, and organic salts. It is suggested from the theoretical work [1] that large charge fluctuation and frustration are responsible for the electric polarization. This charge fluctuation is expected to govern dynamical properties. Actually, the measurements of the low frequency dielectric dispersion and the optical conductivity indicate that the large charge fluctuation remains in charge ordered phase in $LuFe_2O_4$. Motivated by these experimental results, we study charge dynamics in charge ordered system on the layered triangular lattice. We adopt the V-t model where the inter-site electron transfers and the inter-site Coulomb interactions are taken into account. We analyze this model by utilizing the exact diagonalization method and focus on effects of frustration in the charge dynamics. In the 3-fold charge ordered phase associated with the electric polarization, the optical conductivity shows multiple-peak structure in a wide energy range. In finite temperature, the low frequency oscillator strength of the optical conductivity and the dynamical charge correlation functions in 3-fold charge ordered phase decrease slower than those in the non-polar 2-fold charge ordered phase. These results imply the strong charge fluctuation in the 3-fold charge ordered phase due to the geometrical frustration. [1] M. Naka et al. Phys. Rev. B. **77** 224441.

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