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Collective charge excitation in low dimensional organic salts MAKOTO NAKA, SUMIO ISHIHARA, Department of Physics, Tohoku University — Electronic ferroelectricity is known as phenomena where electric polarization is attributed to the charge order without inversion symmetry. This is seen in some transition metal oxides, e.g. $LuFe_2O_4$, and charge transfer salts. Quasi 2-dimesional organic salt kappa-$(ET)_2Cu_2(CN)_3$ is one of the electronic ferroelectricities. Two ET molecules construct a dimer and are arranged on a triangular lattice. Recently, it is reported that a dielectric anomaly is experimentally observed around 30K. An origin of this dielectric anomaly is thought to be an ?electronic? dipole generated by a localized hole in one side of the ET molecules in dimers. Motivated by the experimental results, we study charge dynamics in dimer-Mott insulating system with internal charge degree of freedom in a dimer. We adopt the three kinds of models, extended Hubbard model, V-t model and its effective pseudo-spin model. We analyze these models by utilizing the exact diagonalization method and spin wave approximation, and focus on the collective charge excitation. In the ground state, paraelectric dimer-Mott phase and ferroelectric charge ordered phase compete with each other. We find the low-energy intra-dimer charge excitations which show a strong light polarization dependence. The collective excitation mode which is observable by light being parallel to the electric polarization shows a softening and a remarkable frequency dispersion around the phase boundary. This collective charge excitation of the ?electronic? dipole explains the recently observed peak structure in optical conductivity for the THz region.

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