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Electrodynamics of a multiferroic perovskite manganite in terahertz frequency range[1] N. KIDA, ERATO-JST, Y. IKEBE, R. SHIMANO, Y. YAMASAKI, Univ. Tokyo, T. ARIMA, ERATO-JST and Tohoku Univ., Y. TOKURA, ERATO-JST, CERC-AIST, and Univ. Tokyo — There is a growing interest for the study of the magnetoelectric effect, as stimulated by the observation of a magnetic control of the ferroelectric polarization in perovskite manganites. Recently, a broad peak structure was observed in $TbMnO_3$ and $GdMnO_3$ in terahertz (THz) frequency range [1]. The spin-wave excitation driven by ac electric field, which is referred to as electromagnon, was proposed as an origin of this structure. However, detailed characteristics, especially, the role of the rare-earth ion and the relationship between the complex dielectric constant $\tilde{\epsilon}$ in THz and low ($\sim$kHz) frequency range were not clarified yet. Here we used the THz time-domain spectroscopy to directly extract $\tilde{\epsilon}(\omega)$ (1.2– 4.5 meV) of a multiferroic perovskite manganite and discuss the origin of the ferroelectricity, as manifested by a gigantic response of the low-frequency $\tilde{\epsilon}(\omega)$ with temperature and magnetic fields. [1] A. Pimenov *et al.*, Nat. Phys. **2**, 97 (2006).

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