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Theory of magnetoelectric effects in field-induced canted affeti-ferromagnetic state in $BiFeO_3$ NOBUO FURUKAWA, Aoyama Gakuin Univ., SHIN MIYAHARA, Fukuoka Univ. — We investigate static and dynamical magnetoelectric feffects in the field-induced antiferromagnetic state of the multiferroic compound $BiFeO_3$ with a distorted perovskite structure, based on calculations for a Heisenberg model with Dzyaloshinsky-Moriya interactions under external magnetic fields. Due to the distorted crystal structure, spins couple to electric polarizations via the spin-dependent metal-ligand hybridization mechanism. Due to the coupling, magnitude and direction of electric polarization depends on the external magnetic fields. Moreover, there exists a magnon which is both magneo- and electro-active due to magnetoelectric couplings, i.e., so-called a toroidalmagnon. As a result, the resonance of the toroidalmagnon shows non-reciprocal directional dichroism, i.e., the absorption intensity depends on the sign of the light propagating directions. We propose experimental conditions to clarify the existence of the couplings.

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