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Electromagnon Resonance and Optical Magnetoelectric Effect in a Polar Magnet (Zn, Fe)$_2$Mo$_3$O$_8$ TAKASHI KURUMAJI, RIKEN, CEMS, YOUTAROU TAKAHASHI, JUN FUJIOKA, RYOJI MASUDA, HIROE SHISHIKURA, SHINTARO ISHIWATA, Univ. of Tokyo, YOSHINORI TOKURA, RIKEN, CEMS, RIKEN, CEMS COLLABORATION, UNIV. OF TOKYO COLLABORATION, PRESTO COLLABORATION — Magnetic excitations are investigated for a hexagonal polar magnet (Zn, Fe)$_2$Mo$_3$O$_8$ by terahertz spectroscopy. We observe magnon modes including an electric-field active magnon, electromagnon, in the collinear antiferromagnetic phase with spin parallel to the c axis as well as the ferrimagnetic phase induced by Zn-doping. In the ferrimagnetic phase, we observe nonreciprocal optical effect, gyrotropic birefringence (GB), which is the nonreciprocal rotation of the optical fast/slow axes due to the diagonal magnetoelectric susceptibilities [1, 2]. An electric/magnetic-field active excitation resonantly enhances the GB effect, demonstrating an optical magnetoelectric functionality of electromagnon in multiferroics. [1] W. F. Brown, Jr., R. Hornreich, and S. Shtrikman, Phys. Rev. 168, 574 (1968). [2] E. B. Graham, and R. E. Raab, Phil. Mag. B 66, 269 (1992).

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