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**Ultrafast spin dynamics and switching via the spin transfer torques in antiferromagnet with weak ferromagnet** T. H. KIM, Gwangju Institute of Science and Technology (GIST), Republic of Korea, P. GRUENBERG, Gruenberg Center for Magnetic Nanomaterials, GIST, Republic of Korea, S. H. HAN, Mokpo National University, Republic of Korea, B. K. CHO, GIST, Republic of Korea — The spin-torque driven dynamics of the antiferromagnet with canted moments was investigated analytically based on the Landau-Lifshitz-Gilbert-Slonczewski equation with the antiferromagnetic ($\boldsymbol{l}$) and ferromagnetic ($\boldsymbol{m}$) order parameters. Although Dzyaloshinskii-Moriya (DM) torque splits the degenerate resonant mode into Sigma-mode and Gamma-mode, the equation of motion was found to be described by 2-dimansional pendulum model of $\boldsymbol{l}$ as like simple antiferromagnet. Because $\boldsymbol{l}$ is coupled to $\boldsymbol{m}$, the close examination of m leads both to reveal $\boldsymbol{l}$'s dynamics and to estimate DM energy. For example, the second harmonic of resonant frequency, together with the resonant frequency softening phenomenon, is the evidence for the non-linear behavior of $\boldsymbol{l}$. The precessional ellipticity of m in Sigma-mode determines the DM energy through the following relation; $m_{\mathrm{y}}/m_{\mathrm{x}} \sim \omega_{\mathrm{sigma}}/D$ where $\omega_{\mathrm{sigma}}$ is resonant frequency in Sigma-mode. Finally, we discuss magnetization reversal efficiency by varying DM energy, anisotropy barrier and damping.

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