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Spin motive electric field driven by magnetic vortex motion JUNICHIRO OHE, Tohoku University, STEWART E. BARNES, University of Miami, SADAMICHI MAEKAWA, Tohoku University — The current-induced magnetization dynamics realized in spintronics devices involve both of charge and spin degrees of freedom. Recently, it has been pointed out that the magnetization dynamics induces an effective electric field acting on the conduction electrons through the spin Berry phase. The effective electric field, or a "spin motive electric field," was investigated for a simple one-dimensional domain wall. It is difficult to estimate analytically this effective electric field in actual systems, because the magnetization dynamics obeys the non-linear Landau-Lifshitz equation. In this report, we describe numerical studies of the spin motive electric field induced by the dynamics of a vortex core. The vortex structure can be realized in a Permalloy disc. It is known that the magnetic vortex core shows a resonant motion when the oscillating magnetic field is applied. The direction of the core is switched rapidly by applying a pulsed such magnetic field. During the core motion, we obtain an electric field near the core. The direction of the electric field is perpendicular to the direction of the core motion. We also obtain the electric field driven by spin waves which are excited by the core switching. We propose an experimental setup for measuring the electric field. The calculated voltage is large enough to measure. We show that the voltage induced by core switching is quite large.

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