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Slonczewski-like torque due to Rashba spin-orbit coupling in thin magnetic layers HYUN-WOO LEE, KYOUNG-WHAN KIM, Department of Physics, POSTECH, SOO-MAN SEO, Department of Material Science and Engineering, Korea University, JISU RYU, Department of Physics, POSTECH, KYUNG-JIN LEE, Department of Material Science and Engineering, Korea University — Recent experiments report that large Rashba spin-orbit coupling (RSOC) can exist for ferromagnetic nanostructure with structural asymmetry. Previous theories of spin-transfer torque (STT) induced by RSOC addressed this problem by introducing an effective field due to RSOC. However, the Rashba field is not sufficient, and another STT perpendicular to the Rashba STT is required to explain experimental results. In this work, we propose the mechanism of such STT based on nonadiabaticity and examine the effect of the torque. By studying the domain wall (DW) motion, we demonstrate that the DW motion is significantly affected by our result. We show that the effect of the RSOC-induced torque on the DW velocity can be so large that the DW can move along the current direction without assuming negative nonadiabaticity or spin polarization. Our result is discussed in comparison with experimental results.

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