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Modification of the Stoner-Wohlfarth Astroid by a Spin-Polarized Current[1] SHU YAN, ZHELIN SUN[2], YA. B. BAZALIY, Department of Physics and Astronomy, University of South Carolina, Columbia, SC 29208 — Conventional Stoner-Wohlfarth astroid describes the field-induced switching of a nanomagnet with a uniaxial anisotropy. Both theory and experiments show that the spin-transfer torque can change the switching behavior of nanomagnets and therefore modify the astroid. Such a modification was recently analyzed in the limit of small currents [1]. To explore the modification of the astroid by a current of arbitrary magnitude we propose an exact method capable of finding the switching boundaries for a magnet described by an LLG equation with the Slonczewski's spin-torque term. Our approach takes into account both the local destabilization of equilibria and the equilibrium collisions. The self-crossing nature of the modified astroid is explained and a novel region with three stable equilibria is predicted in our result.

[1] Y. Henry, S. Mangin and J. Cucchiara, J. A. Katine, and E. E. Fullerton, Phys. Rev. B 79, 214422(2009).

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