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Size-dependence evolution of quasiuniform states in thin circular dots Z. WEI, M. LAI, C.R. CHANG, Physics Dept., NTU, J. C. WU, Physics Dept., NCUE, J. LAI, Physics Dept., NTU — The three-dimensional micromagnetic simulations of submicron-sized permalloy dots are carried out by the integration of the Landau-Lifshitz-Gilbert equation. We take into account the exchange interactions, magnetostatic interactions, and anisotropy field in our simulation. Each dot is divided into many cubic cells, and the side length of each cubic cell is set to be 3 nm, which is much smaller than the exchange length $R_0 = C^{1/2}/M_s$ of the permalloy, to promise the accuracy of our simulation. When the largest angular variation between successive iterations is below 10^{-8}, the system is assumed to reach the equilibrium state. From the micromagnetic simulation, it is found that as the diameter of the permalloy thin circular dot becomes larger than some critical size, the single-domain state turns out to be unstable and transforms to a 'C' state. When the diameter is above another larger critical diameter the 'C' state becomes unstable and a vortex enters the dot. Above another even larger critical diameter only the 'S' state and vortex state can exist. In the diameter range between the upper diameter limit of 'C' state and the lower diameter limit of 'S' state, only the vortex state can exist.

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