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Dynamics of half-quantized vortices in nanoscale superconducting composite structures (d-dot) MASARU KATO, MSAYUKI AKO, Dept. Math. Sci, Osaka Prefecture University, MASAHIKO MACHIDA, CCSE, JAERI, TOMIO KOYAMA, IMR, Tohoku University, TAKEKAZU ISHIDA, Dept. Phys. Electronics, Osaka Pref. Univ. — Mesoscopic or nanoscopic superconductors shows sometime peculiar phenomena. When nanosize high-Tc d-wave superconductor is embedded in conventional s-wave superconductor matrix, it shows various spontaneous magnetic flux depending on the shape of the d-wave superconductor. The appearance of static magnetic field shows such state breaks the time reversal symmetry. So there another equally stable state, which has completely reversed magnetic fluxes. Therefore this d-wave superconducting dot in s-wave superconductor, which we call as "d-dot," always has equally stable two states. For this system, we developed the numerical simulation method, which is based on the two component Ginzburg-Landau equation and the finite element method, and investigated the spontaneous magnetic field distribution. In this study we extended these previous study and we developed dynamical simulation method for d-dot's. Then we study the effect of external current to the spontaneous magnetic fluxes. We show external current causes the transition between two equally stable magnetic flux structures. This means the potential applications of these d-dot's.

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