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A Peculiar Solitary Re-entrant Superconductivity Induced by an External Magnetic Field in Ferromagnet-Superconductor Heterostructures

Proshin Y., Avdeev M.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2014, Springer Science+Business Media New York. We solve the boundary value problem for the Usadel-like equations in the dirty limit case for thin-film three-layered ferromagnet (F) - superconductor (S) structures. Our theoretical approach taking into account of the asymmetry and triplet superconducting correlations is valid in the external magnetic field presence as in the real experimental setup for the FS spin valve explorations. Based on the recent experimental data obtained for the symmetrical (FSF) trilayer in an external magnetic field, we expand the theoretical description to the asymmetrical FSF and FFS trilayers. We also consider the peculiar re-entrant superconductivity and solitary superconductivity induced by the external magnetic field for the FFS trilayer.

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Keywords

Ferromagnetism, Proximity effect, Spin valve, Superconductivity