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Proximity effect in four-layered ferromagnet/superconductor nanostructures: decoupled superconductivity and hierarchy of critical temperatures NAIL G. FAZLEEV, University of Texas at Arlington, Arlington, Texas, USA, YURII N. PROSHIN, Kazan State University, Kazan, Russia, MANSUR G. KHUSAINOV, Vostok branch, Kazan State Technical University, Chistopol, Russia — The four-layered nanostructure consisting of rather dirty superconducting (S) and ferromagnetic (F) metals is studied within the theory of the proximity effect taking detailed account of the boundary conditions. The F/S nanostructures with four and more F and S layers are shown to have considerably richer physics than the F/S/F trilayer and F/S superlattices. The dependence of the critical temperatures versus the F layers thicknesses is investigated. It is shown that the F/S/F′/S′ nanostructure can experience decoupled superconductivity. The latter manifests itself through a hierarchy of the critical temperature Tc, which can be different for different S and S′ layers. An optimal set of parameters is determined, for which the difference between the critical temperatures becomes significant, and the corresponding phase diagrams are constructed. A conceptual scheme of a new control device based on the F/S/F′/S′ nanostructure with superconducting and magnetic recording channels that can be controlled separately using a weak external magnetic field is proposed.

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