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Possible origin for oscillatory superconducting transition temperature in superconductor/ferromagnet multilayers

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Abstract

We have studied superconducting and magnetic properties of sputtered Fe/Nb/Fe trilayers. For a fixed Nb thickness and with changing Fe thickness, dFe, a nonmonotonic behavior of the superconducting transition temperature Tc was observed with a maximum at dFe ≈ 10 Å. The analysis of the magnetization data revealed that for dFFe ≤7 Å the Fe layer is nonmagnetic. The interpretation of the observed Tc behavior is attributed to the existence of this magnetically "dead" layer and the change of the interaction of the Cooper pairs with this layer at the onset of ferromagnetism for dFe ≥ 7 Å.