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Proximity effect in Exchange-spring/Superconductor hybrid system[1] JIYEONG GU, JESSE BURGESS, Department of Physics and Astronomy, California State University, Long Beach, CA 90840 — In ferromagnet/superconductor hybrid systems, it has been well known that the superconducting property is modified when the local magnetic environment changes in the adjacent ferromagnetic layers. In exchange-coupled hard/soft ferromagnet systems, the mutual coupling of the soft and hard magnetic layers creates a spiral magnetic domain structure. We utilized the exchange-coupled hard/soft ferromagnet system, such as NiFe/SmCo and NiFe/SmFe, to vary the magnetic environment near the superconducting layer. The switching behavior of both NiFe/SmCo and NiFe/SmFe systems were studied. In NiFe/SmFe systems, the reversible switching of the soft-layer was sharper, and occurred over a much smaller applied magnetic field range, than for NiFe/SmCo. The magnetic field required to achieve soft-layer saturation was also an order of magnitude smaller, making it more responsive to weaker applied fields. The superconducting property of the hybrid system was investigated as functions of the temperature and magnetic field.

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