Magnetic Field of In-Plane Vortices Outside Layered Superconductors

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Abstract

The out-of-plane penetration depth λ_c can be determined from scanning SQUID microscope measurements of the magnetic field emerging from the side of a layered superconductor containing a Josephson vortex parallel to the layers. Since the SQUID microscope measures the flux through a small loop held at some distance from the surface, it is essential to have a good theoretical method for calculating the anisotropic magnetic field distribution. When $\lambda_c \gg \lambda_{ab}$, this field distribution has highly elliptical contours of constant field deep inside the sample; it spreads as the magnetic flux penetrates through the surface; and far from the surface it resembles the field generated by a point magnetic monopole. In this poster, we show how the London equations with an anisotropic effective mass tensor can be used to solve for the magnetic field generated by an in-plane Josephson vortex both inside a semi-infinite superconductor and in the space outside the superconductor.