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A Practical Algorithm for Fitting Magnetic Moment Data for Superconducting Thin Films and Multilayers in Parallel Magnetic Fields[1]
SERGIY KRYUKOV, WENTAO XU, LANCE DE LONG, University of Kentucky
— Superconducting thin films and multilayers in DC magnetic fields applied nearly parallel to the film plane can yield spurious magnetization data dominated by extreme shape anisotropy and strong diamagnetism of a confined supercurrent. This situation may lead to highly reproducible discontinuities or apparently random "instabilities" when measured with SQUID magnetometers such as the ubiquitous Quantum Design MPMS, which requires samples to behave as an ideal point-dipole. We have devised an accurate multipole fitting routine for the raw SQUID voltmeter output that eliminates spurious contributions to the axial dipole moment from transverse (off-axis dipole) or non-point-dipole axial magnetizations. We demonstrate this method as applied to Nb/Ni multilayers and Nb thin films and foils of various thicknesses that probe the influence of supercurrent confinement on the non-dipole response.

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Sergiy Kryukov
University of Kentucky

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