Distribution of a Local Magnetic Field in Superconductors with an Uncorrelated Random Lattice of Abrikosov Vortices

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Abstract

The distribution of a local magnetic field near the surface of a uniaxial anisotropic type-II superconductor is determined in the framework of the London model in the case when the Abrikosov vortices are randomly distributed in the superconductor. The distribution of a local magnetic field is obtained as a function of the distance from the surface of the superconductor. It is demonstrated that the shape of the distribution of the local magnetic field near the surface differs substantially from that in the bulk of the superconductor. This difference should be taken into account in interpreting experimental data on the local magnetic field in the surface region of the superconductor and in thin superconducting films (with a thickness of less than or equal to λ, where λ is the depth of penetration of the magnetic field into the superconductor). It is shown that, as in the case of a regular lattice of vortices, the value of λ, can be determined from observations of the distribution of the local magnetic field in type-II superconductors with an uncorrelated random lattice of vortices. © 2004 MAIK "Nauka/ Interperiodica".