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Macroscopic electrodynamics of hard superconductors

The coarse-grained electrodynamics in a long cylindrical hard superconductor can be described by the Bean's critical state model. The equations describing the evolution of the magnetic field H and of the electric field E inside the superconductor are solved using a quasistatic approximation based on a variational approach proposed by Badia and Lopez. I shall show that H and E admit an explicit representation in terms of geometric quantities related to the cross-section of the superconductor. Our technique can also be applied in the case of an anisotropic behavior of the sample.