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Onset of superconductivity in decreasing fields for general domains. (English) Zbl 1056.82523
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Summary: Ginzburg-Landau theory has provided an effective method for understanding the onset of superconductivity in the presence of an external magnetic field. In this paper we examine the instability of the normal state to superconductivity with decreasing magnetic field for a closed smooth cylindrical region of arbitrary cross-section subject to a vertical magnetic field. We examine the problem asymptotically in the boundary layer limit (i.e., when the Ginzburg-Landau parameter, k , is large). We demonstrate that instability first occurs in a region exponentially localized near the point of maximum curvature on the boundary. The transition occurs at a value of the magnetic field associated with the half-plane at leading order, with a small positive correction due to the curvature (which agrees with the transition problem for the disc), and a smaller correction due to the second derivative of the curvature at the maximum.

MSC:

82D55 Statistical mechanical studies of superconductors

Cited in **1** Review
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