The first order phase transition of Type I superconductors: Bardeen hysteresis explained

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Macroscopic and mesoscopic-size Type I superconductors exhibit a first order phase transition in H-T space. For specimens undergoing an adiabatic phase transition, the latent heat is supplied or absorbed by the normal regime. This process, the magneto-caloric effect, proceeds isentropically and for macroscopic-size specimens, through an intermediate state of superconductive and normal phase domains. For mesoscopic-size specimens, the intermediate state is precluded in view the specimen dimension and the range of coherence are commensurate. John Bardeen proposed the appearance of magnetic hysteresis prior to phase nucleation in order for the phase transition to proceed isentropically. The talk will explain how Bardeen's magnetic hysteresis is a consequence of positive interphase boundary surface energy. [1]

[1] The European Physical Journal Special Topics, ISSN: 1951-6355: Non-Equilibrium Systems and Foundations of Quantum Physics, a publication of Springer, V. 230, No. 4, 993-1001 (June, 2021);
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