
Übungen zu „Elektronische Eigenschaften von Festkörpern II: Supraleitung“ (SS2023)

Exercise sheet 2 · Tutorial on 10.05.2023 · (A.Ustinov/G.Fischer)

4) Magnetic field and current distributions in superconductors

Consider an infinite superconducting plate (in yz -plane) of thickness d (with $-d/2 \leq x \leq +d/2$). Calculate and sketch the distributions of the magnetic field \vec{H} and of the supercurrent density \vec{j} for the following cases:

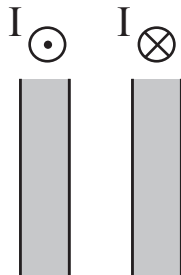
- The plate is placed in a uniform magnetic field H_0 (with $H_0 \parallel z$).
- There is no applied magnetic field, but the plate carries a uniform current I along y .

5) Magnetic field and current distributions in superconductors without calculations

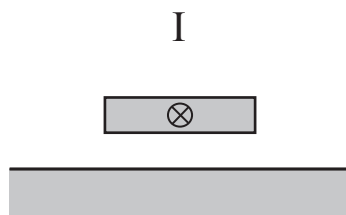
Find the magnetic field and current distributions for the following geometries of superconducting plates. No calculation is necessary when using results from exercise 4) and your physical insight.

- Two infinite slabs, each carrying the same current I , but in opposite directions.
- One slab which carries a current I , located above a superconducting semi-space.
- Two parallel and closely spaced slabs, one of which carries a current I . What will happen if the two slabs are brought into contact ?

a)



b)



c)

