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Simulations of the intermediate state in type-I superconductors
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We present simulations of the itermediate state of type-I superconducting films. We solve numerically the time dependent Ginzburg-Landau equations taking into account the demagnetizing fields via the Biot-Savart law. We reproduce several features of the intermediate state observed in experiments, particularly droplet and laberynthine striped patterns are obtained depending on the applied field H_a and magnetic history. For small square samples we find an important influence of the surface barriers which leads to a saw-tooth behavior of the magnetization as a function of H_a and very geometric patterns when slowly increasing H_a, and to a positive magnetization and symmetry-breaking structures when slowly decreasing H_a. As a general feature we find that there is a strong influence on the initial conditions and magnetic history in the structures of the intermediate state patterns observed.

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