

## Modeling layered HTSC with short-range attractive vortex-vortex interaction potentials using Monte Carlo approach

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Currently, it is of interest to study the magnetic properties of HTSC at the mesoscopic level. One of the best methods of numerical modeling in such cases is the Monte Carlo method. In our work, an attempt is made to apply this algorithm to some unconventional superconductors. Calculations were based on Lawrence-Doniach model, Gibbs free energy was minimized using stochastic method. The survey with 2 different vortex-vortex interaction potentials was carried out. The first one can represent intertype HTSC ( $\kappa = \frac{1}{\sqrt{2}}$ ), and the second one corresponds to ferromagnetic superconductors. Magnetic field distribution and magnetization curves were modelled. As cluster structures were obtained, the dependence of vortex clusterization on the temperature of HTSC in the first potential was investigated. Moreover, the study of behavior of vortex clusters with various configurations of defects was conducted. As for ferromagnetic superconductors, the dependence of the field distribution on magnetic susceptibility has been investigated.

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