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Structures of vortices in a superconductor under spatially varying fields

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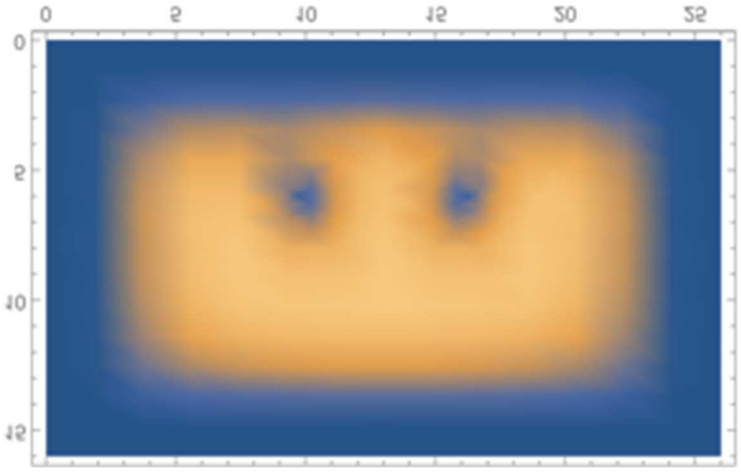
We study behavior of vortices in a type II superconductor under spatially varying fields. Because in application of superconductors, such as an electromagnet, spatially varying fields appear. In previous study, we found directions of vortices are not parallel to the field in a chiral helimagnet /superconductor bilayer structure [1,2]. The origin of this behavior may come from interaction between vortices or screening current at edges of the superconductor.
In this study, we investigate structures of vortices in a superconductor under spatially varying fields by solving the Ginzburg-Landau equation, in order to clarify the origin of previous results. First, we obtain structures of vortices under a constant field tilted π/4 from z-axis to investigate influences of edge currents [Fig.1]. In this case, vortices are parallel to the field, therefore, edges of the superconductor do not affect the vortex structures. We conclude previous results may come from interaction between two vortices that are not parallel. We will show structures of vortices under various fields.



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