An Abelian Higgs model of pulsed field magnetization in superconductors

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Pulsed field magnetization leads to trapped magnetic field persistent for long times.We present a one-dimensional model of the interaction between an electromagnetic wave and a superconducting slab based on the Maxwell-Ginzburg-Landau (Abelian Higgs) theory. We first derive the model starting from a Lagrangian coupling the electromagnetic field with the Ginzburg-Landau potential for the superconductor. Then we explore numerically its capabilities by applying a Gaussian vector potential pulse and monitoring usual quantities such as the modulus and the phase of the order parameter. We also introduce defects in the computational domain. We show that the presence of defects enhances the remanent vector potential and diminishes the modulus of the order parameter, in agreement with existing experiments. [1]

[1] J. G. Caputo, I. Danaila, C. Tain. *An abelian higgs model of pulsed field magnetization in superconductors.* Journal of Physics : Conference Series, **2043(1)**, 012006, 2021. doi :10.1088/1742-6596/2043/1/012006.

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