

1046-35-1850

Patricia E. Bauman, Department of Mathematics, Purdue University, West Lafayette, IN 47906, and **Zhenqiu Xie*** (xie2@purdue.edu), Department of Mathematics, Purdue University, West Lafayette, IN 47906. *Minimizers of the Lawrence-Doniach Model for Superconductors under Weak Coupling and a Parallel or Slightly Tilted Field*. Preliminary report.

We consider minimizers to the Lawrence-Doniach energy for superconductors with coupled layer structures. When the exterior magnetic field is parallel or slightly tilted to the layers and the Josephson coupling between layers is small, we prove that the global minimizer has no vortices on layers. Using Lyapunov-Schmidt techniques, we express the minimizing state as a C^1 function of the coupling constant and the applied magnetic field. We also prove stability and obtain detailed information on the nature of the order parameter on each layer and the induced magnetic field in this case. Our results show that in this setting, even in large magnetic fields, stable solutions without vortices can occur. In this case, the order parameter is non-uniform in each layer, but has a nearly uniform phase jump between adjacent layers. (Received September 16, 2008)