1018-35-24 **Yangsuk Ko*** (yko@csub.edu), Department of Math, CSUB, 9001 Stockdale Hwy, Bakersfield, CA 93311, and **Patricia Bauman** (bauman@math.purdue.edu), Department of Mathematics, Purdue University, West Lafayette, IL 47907. *Analysis of Solutions to a Coupled Ginzburg-Landau System for Superconductors of Layered Structure.*

We consider a coupled Ginzburg-Landau (GL) system, the so-called the Lawrence-Doniach (LD) system, which models layered superconductors as a stack of nonlinearly coupled, parallel 2-dimensional superconducting layers, separated by an insulating material, in an applied magnetic field. We prove that weak solutions in a divergence-free gauge are uniformly bounded and continuous, and satisfy a priori estimates based on elliptic theory and single layer potentials. Moreover, we show the existence of an upper critical field $\bar{h}$ such that when $|\vec{H}| > \bar{h}$ (where $\vec{H} = h\vec{v}$ in a direction of unit vector $\vec{v}$ nontangential to the layers), the normal (non-superconducting) state is the only solution to the LD system. It follows from these results that under certain assumptions on the relative values of parameters in the model, minimizers of the LD energy converge, as the interlayer spacing tends to zero, to minimizers of an appropriate anisotropic GL energy in 3 dimensions. Finally, we derive that $\bar{h} \leq C\kappa/\mu$ for all κ sufficiently large and all unit vectors $\vec{v}$ satisfying $\vec{v} \cdot \vec{e_3} \geq \mu > 0$ for the LD system, where κ is the GL constant for the superconducting material and C is independent of κ and μ. (Received January 12, 2006)