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On the first critical field of a 3D anisotropic superconductivity model

We analyze the Lawrence-Doniach model for layered superconductors occupying a bounded generalized cylinder, $\Omega \times (0, L)$, in \mathbb{R}^3 , where the cross-section Ω is a bounded simply connected domain in \mathbb{R}^2 . For an applied magnetic field $\vec{H}_{ex} = h_{ex}\vec{e}_3$ that is perpendicular to the layers, there are two critical values for h_{ex} at which the superconductor has phase transitions. In this talk, we will present some recent work on characterizations of the first critical field at which the magnetic field first penetrates the superconductor to create defects in the material. Such characterizations are achieved by analyzing a mean field model that is the Gamma-limit of the Lawrence-Doniach model in appropriate regimes.