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Thin Film Limits for Ginzburg–Landau with Strong Applied Magnetic Fields

We study thin-film limits of the full three-dimensional Ginzburg–Landau model for a superconductor in an applied magnetic field oriented obliquely to the film surface. We obtain Γ -convergence results in several regimes, determined by the asymptotic ratio between the magnitude of the parallel applied magnetic field and the thickness of the film. Depending on the regime, we show that there may be a decrease in the density of Cooper pairs. We also show that in the case of variable thickness of the film, its geometry will affect the effective applied magnetic field, thus influencing the position of vortices.