



Ginzburg-Landau Vortices

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Book Condition: New. Publisher/Verlag: Springer, Basel | The original motivation of this study comes from the following questions that were mentioned to one of us by H. Matano. Let $G = B = \mathbb{R}^2$. Consider the Ginzburg-Landau functional $E_\varepsilon(u) = \int_G |\nabla u|^2 + \frac{1}{2\varepsilon} \int_G (|u|^2 - 1)^2$ which is defined for maps $u \in H^1(G; \mathbb{C})$ also identified with $H^1(G; \mathbb{R}^2)$. Fix the boundary condition $u|_{\partial G} = \gamma$ on ∂G and set $H_\varepsilon = \{u \in H^1(G; \mathbb{C}) : u|_{\partial G} = \gamma\}$. It is easy to see that (2) is achieved by some u_ε that is smooth and satisfies the Euler equation in G , $-\Delta u_\varepsilon = \varepsilon^{-2} u_\varepsilon (|u_\varepsilon|^2 - 1)$ (3) on G . The maximum principle easily implies (see e.g., F. Bethuel, H. Brezis and F. Hélein (2)) that any solution u_ε of (3) satisfies $|u_\varepsilon| \sim 1$ in G . In particular, a subsequence (u_{ε_j}) converges in the $W^{1,2}(G)$ topology to a limit u . | I. Energy estimates for S^1 -valued maps. - 1. An auxiliary linear problem. - 2. Variants of Theorem I.1. - 3. S^1 -valued harmonic maps with prescribed isolated singularities. The canonical harmonic map. - 4. Shrinking holes. Renormalized energy. - II. A lower bound for the energy of S^1 -valued maps on perforated domains. - III. Some basic estimates...



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