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Degenerate Perturbations of a Two-Phase Transition Model

We study the $\Gamma-$convergence as $\epsilon \to 0^+$ of the family of degenerate functionals

$$Q_\epsilon(u) = \epsilon \int_\Omega \langle ADu, Du \rangle \, dx + \frac{1}{\epsilon} \int_\Omega W(u) \, dx$$

where $A(x)$ is a symmetric, *non negative* $n \times n$ matrix on Ω (i.e. $\langle A(x)\xi, \xi \rangle \geq 0$ for all $x \in \Omega$ and $\xi \in \mathbb{R}^n$) with regular entries and $W : \mathbb{R} \to [0, +\infty)$ is a double well potential having two isolated minimum points. Moreover, under suitable assumptions on the matrix A, we obtain a minimal interface criterion for the Γ-limit functional exploiting some tools of Analysis in Carnot-Carathéodory spaces. We extend some previous results obtained for the non degenerate perturbations Q_ϵ in the classical gradient theory of phase transitions.

Keywords: Phase transitions, Γ-convergence, Carnot-Carathéodory spaces, minimal interface criterion

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