Centro de Investigação em Matemática e Aplicações
Departamento de Matemática

Seminário

19 de Abril de 2012, Quinta-feira
CLAV – 138 - 14:00 horas

Coupled Second Order Singular Perturbations
for Phase Transitions

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Resumo

In this talk I will present some joint work with M. Baía, M. Chermisi and J. Matias regarding the asymptotic behaviour of a family of coupled singular perturbations of a non-convex second order functional arising from the theory of phase transitions.

Precisely, we obtain an integral representation for the Γ-limit, with respect to the $L^1(\Omega; \mathbb{R}^N)$ convergence, of the family of functionals

$$\frac{1}{\varepsilon} \int_\Omega f(x, u(x), \varepsilon \nabla u(x), \varepsilon^2 \nabla^2 u(x)) \, dx$$

where the vector-valued function u represents the density of a mixture of N fluids ($N \in \mathbb{N}$, $N \geq 2$), occupying a fixed container $\Omega \subset \mathbb{R}^d$ ($d \in \mathbb{N}, d \geq 2$).

In our analysis, the bulk energy density f is assumed to be continuous, positive and such that for all $x \in \Omega$ the function $f(x, \cdot, 0, 0)$ achieves its minimum value zero at exactly two vectors $\alpha, \beta \in \mathbb{R}_+^N$, $\alpha \neq \beta$. We will also work under the constraint that the total amount of bulk material is preserved.