Alberti, G.

Variational models for phase transitions, an approach via Γ-convergence. (English)

Zbl 0957.35017

Buttazzo, G. (ed.) et al., Calculus of variations and partial differential equations. Topics on geometrical evolution problems and degree theory. Based on a summer school, Pisa, Italy, September 1996. Berlin: Springer. 95-114, 327-337 (2000).

Based on a lecture, the paper is an introduction to Γ-convergence with the aim of outlining the proof of the Modica-Mortola theorem in a way that would generalize to other theorems in the same line.

At the equilibrium, two immiscible, incompressible fluids arrange themselves minimizing the area of the interface separating them, i.e. the energy of this (classical) model is a surface energy, F. Alternatively, one can study the system of the two fluids assuming the transition to be a continuous phenomenon occuring in a thin layer identified, on a macroscopic level, with the interface. This is called the Cahn-Hillard model, whose energy is E_ε. Essentially, the Modica and Mortola theorem says that suitable rescalings of the functionals E_ε Γ-converge to F.

For the entire collection see [Zbl 0932.00045].

Reviewer: Alina Stancu (Villeneuve D'Ascq)

MSC:

35B27 Homogenization in context of PDEs; PDEs in media with periodic structure

49J45 Methods involving semicontinuity and convergence; relaxation

Keywords:

Cahn-Hillard model; Modica-Mortola theorem; phase transitions