

# The effective energy in the Allen–Cahn model with deformation

M. Šilhavý, Prague

**Abstract** The sharp interface limit of a diffuse interface theory of phase transitions is considered in static situations. The diffuse interface model is of the Allen–Cahn type with deformation, with a parameter  $\epsilon$  measuring the width of the interface. Equilibrium states of a given elongation and a given interface width are considered and the asymptotics for  $\epsilon \rightarrow 0$  of the equilibrium energy is determined. The interface energy is defined as the excess energy over the corresponding two phase state with a sharp interface without the interface energy. It is shown that to within the term of order  $o(\epsilon)$  the interface energy is equal to  $\sigma\epsilon$  where the coefficient  $\sigma$  is given by a new formula that involves the mechanical contribution to the total energy. Also the corresponding equilibrium states are determined and shown to converge to a sharp interface state for  $\epsilon \rightarrow 0$ .