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Multiscale Relaxation of Convex Functionals

The Γ -limit of a family of functionals

$$u \mapsto \int_{\Omega} f\left(\frac{x}{\epsilon}, \frac{x}{\epsilon^2}, D^s u\right) dx$$

is obtained for $s = 1, 2$ and when the integrand $f = f(x, y, v)$ is a continuous function, periodic in x and y , and convex with respect to v . The 3-scale limits of second order derivatives are characterized.

Keywords: Convexity, periodicity, multiscale limits, Γ -convergence, \mathbb{A} -quasi-convexity, measurability selection criterion.

2000 MSC: 35G99, 49J40, 49J45, 74G65.