

Weighted maximal regularity and its application to the corrector equation

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Considering the discrete corrector equation $\nabla^*(a(\nabla\phi + e)) = 0$ on \mathbb{Z}^d in stochastic homogenization one often asks about the existence of a stationary solution and moment bounds on the solution and its gradient.

Under the assumption of a spectral gap estimate, answers to these questions were given through a series of papers by Gloria & Otto, Gloria & Neukamm & Otto, Ben-Artzi & Marahrens & Neukamm. The latter used a weighted regularity argument for an equation of the form $\nabla^*\nabla u = \nabla^*F$, which was established from the corresponding continuum estimate by a comparison in Fourier space and therefor restricted to the lattice \mathbb{Z}^d .

In order to tread more general graphs, we want to understand weighted regularity directly based on the method of maximal functions on metric measure spaces.