PDE session

The additive structure of elliptic homogenization

Tuomo Kuusi
Aalto University School of Science, Finland

One of the principal difficulties in stochastic homogenization is transferring quantitative ergodic information from the coefficients to the solutions, since the latter are nonlocal functions of the former. In this talk, I will address this problem in a new way, in the context of linear elliptic equations in divergence form, by showing that certain quantities associated to the energy density of solutions are essentially additive. As a result, we are able to prove quantitative estimates on the first-order correctors which are optimal in both scaling and stochastic integrability. The proof of the additivity is a bootstrap argument: using the regularity theory recently developed for stochastic homogenization, we accelerate the weak convergence of the energy density, flux and gradient of the solutions as we pass to larger and larger length scales, until it saturates at the CLT scaling.

This is a joint work with S. Armstrong and J.-C. Mourrat.