



Mathematics and CS Seminar

Optimal artificial boundary conditions for three-dimensional elliptic random media

Lihan Wang

Carnegie Mellon University

Host: Julian Fischer

We are interested in computing the electrical field generated by a charge distribution localized on scale ℓ in an infinite heterogeneous medium, in a situation where the medium is only known in a box of diameter $L \gg \ell$ around the support of the charge. We propose an artificial boundary condition that with overwhelming probability is (near) optimal with respect to scaling in terms of ℓ and L , in the setting where the medium is a sample from a stationary ensemble with a finite range of dependence (set to be unity and in the regime $1 \ll \ell$). The boundary condition is motivated by stochastic homogenization that allows for a multipole expansion [Bella, Giunti, Otto 2020]. This work extends [Lu, Otto, 2021] from two to three dimensions, which requires taking quadrupoles, next to dipoles, into account. This in turn relies on stochastic estimates of second-order, next to first-order, correctors. These estimates are provided for finite range ensembles under consideration, based on an extension of the semigroup approach of [Gloria, Otto 2015]. Joint work with Jianfeng Lu (Duke) and Felix Otto (MPI).

Tuesday, July 19, 2022 04:15pm - 05:15pm

Heinzel Seminar Room / Office Bldg West (I21.EG.101)



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