SEMINARIO

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Stable recovery of piecewise constant conductances on networks with boundary

Abstract: Recovering the conductances of a well-connected spider network with boundary from its Dirichlet-to-Neumann map is an exponentially ill-posed problem for large networks, so despite there is an exact algorithm to solve it [1], the resulting network is very different from the original one. This problem is the discrete analogous to Calderon's Inverse Problem, in which knowing a-priori that the conductivity is piecewise constant with a bounded number of unknown values makes the problem Lipschitz stable [2].

We propose to introduce the hypothesis analogous for the discrete problem that the conductances are constant in each subset of a partition of the set of edges such that the number of subsets is much smaller than the total number of edges and we formulate the problem as a polynomial optimization one, in which we minimize the difference between the Dirichlet-to-Neumann map of the recovered network and the given one plus a term which penalizes the deviation from this hypothesis. We show examples in which we are able to accurately recover the conductances solving this problem.

Joint work with Ángeles Carmona, Andrés Marcos Encinas and María José Jiménez.

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