Computing Eigenvalues of the Laplacian on Rough Domains

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We discuss a recent work in which we prove a general Mosco convergence theorem for bounded Euclidean domains satisfying a set of mild geometric hypotheses. For bounded domains, this notion implies norm-resolvent convergence for the Dirichlet Laplacian which in turn ensures spectral convergence. A key element of the proof is the development of a novel, explicit Poincaré-type inequality, which is of independent interest.

These results are applied construct a universal algorithm capable of computing the eigenvalues of the Dirichlet Laplacian on a wide class of rough domains. This immediately leads to new classifications in the so-called "Solvability Complexity Index Hierarchy" recently inroduced by Hansen et al.