

A Multiscale Discontinuous Galerkin Method for Stationary Schrodinger Equations

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In this talk, we will introduce a multiscale discontinuous Galerkin method for one-dimensional stationary Schrodinger equations which have highly oscillating solutions. Because of the oscillatory behavior of the solutions, traditional numerical methods require extremely refined meshes to resolve the small scale structure of solutions, thus the computational cost is huge. The main ingredient of our method is to incorporate the small scales into finite element basis functions so that the method can capture the multiscale solution on coarse meshes. We prove that the DG approximation converges optimally with respect to the mesh size h in L^2 norm without the constraint that h has to be smaller than the wave length.