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A discontinuous Galerkin method for solving elliptic eigenvalue problems on polygonal meshes with *hp*-adaptivity

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We present a discontinuous Galerkin method for solving elliptic eigenvalue problems on polygonal meshes [1] based on the discontinuous Galerkin composite finite element method (DGCFEM) [2]. In this talk, the key idea of general shaped element domains in DGCFEM is used to construct polygonal elements and applied to eigenvalue problems. Polygonal and polyhedral meshes are advantageous to discretize domains of complicated shape reducing the overall number of elements needed.

A priori convergence analysis is presented for the method and tested on several numerical examples. Some of the numerical examples use non-convex elements that could be considered pathological in the finite element context.

Further, adaptive techniques are presented for DGCFEM and applied to complicated domains [3]. The mesh-adaptivity is based on a residual error estimator specific for DGCFEM. The robustness and accuracy of the adaptive techniques are supported by numerical examples. Interestingly, the convergence rate of the *hp*-adaptive technique is exponential also for polygonal meshes.

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