The Plane Wave Virtual Element Method for the Helmholtz Problem

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Abstract

Concerned with the time-harmonic wave propagation governed by the Helmholtz equation, we present a novel Galerkin approximation that can deal with general polygonal partitions. Virtual element methods have been recently introduced by Brezzi et al. as extension of finite elements to general polygonal decompositions for different classes of definite and semidefinite problems. Here we design and analyse a method for an indefinite problem.

Because of the oscillatory behavior of solutions to the Helmholtz equation, methods that incorporate information about the solution in the form of plane waves have received attention in the last years. Our virtual element method for the Helmholtz problem in two dimensions introduces modulated plane wave basis functions.

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