A BRIEF REPORT ON THE ARTICLE "ERROR ANALYSIS FOR HYBRIDIZABLE DISCONTINUOUS GALERKIN METHOD FOR THE HELMHOLTZ EQUATION"

ABDALLAH BRADJI

Abstract. Discontinuous Galerkin (DG) methods have the disadvantage that the dimension of the piecewise polynomial space is much larger than the dimension of the conforming finite element method. To overcome this situation, it is suitable to use hybridizable discontinuous Galerkin (HDG) methods. HDG methods are developed recently by some authors. The idea of HDG methods are DG methods in which it is possible to introduce new variables on the boundary of elements such that the solution inside each element can be computed in terms of these new variables. In this paper the authors derive new error estimates for a hybridizable discontinuous Galerkin scheme applied to the Helmholtz equation. They also provide several numerical results justifying these new error estimates. An interesting observation is that, after eliminating the internal element degrees of freedom, the condition number of the condensed hybridized system is seen to be almost independent of the wave number.

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1. some basic knowledge and literature

1. Discontinuous Galerkin (DG) method has some nice features. Among these nice features, the polynomial degree can be changed from an element to another to compensate for different sizes in order to control dispersion, and some types of non–standard meshes can be handled.
2. DG has the disadvantage that the dimension of the piecewise polynomial space is much larger than the dimension of the conforming finite element method.
3. Some literature on the subject [1, 2, 3, 4].

References

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Department of Mathematics, university of Annaba–Algeria
E-mail address: bradji@cmi.univ-mrs.fr
URL: http://www.cmi.univ-mrs.fr/~bradji/

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