

A HIGH ORDER HDG METHOD FOR CURVED-INTERFACE PROBLEMS

WEIFENG QIU, MANUEL SOLANO, AND PATRICK VEGA

ABSTRACT. We generalize the technique of [*Solving Dirichlet boundary-value problems on curved domains by extensions from subdomains*, SIAM J. Sci. Comput. 34, pp. A497-A519 (2012)] to elliptic problems with mixed boundary conditions and elliptic interface problems involving a non-polygonal interface. We study first the treatment of the Neumann boundary data since it is crucial to understand the applicability of the technique to curved interfaces. We provide numerical results showing that, in order to obtain optimal high order convergence, it is desirable to construct the computational domain by interpolating the boundary/interface using piecewise linear segments. In this case the distance of the computational domain to the exact boundary is only $\mathcal{O}(h^2)$.

Keywords: Discontinuous Galerkin, high order, curved boundary, curved interface.

Mathematics Subject Classifications (2010): 65N30

REFERENCES

- [1] B. Cockburn, W. Qiu and M. Solano. A priori error analysis for HDG methods using extensions from subdomains to achieve boundary-conformity. *Mathematics of Computation*, 83(286): 665-699, 2014.
- [2] B. Cockburn and M. Solano. Solving Dirichlet boundary-value problems on curved domains by extensions from subdomains. *SIAM Journal on Scientific Computing*, 34: A497-A519, 2012.

DEPARTMENT OF MATHEMATICS, CITY UNIVERSITY OF HONG KONG, HONG KONG
E-mail address: weifeqiu@cityu.edu.hk

DEPARTAMENTO DE INGENIERÍA MATEMÁTICA AND CI²MA, UNIVERSIDAD DE CONCEPCIÓN, CHILE
E-mail address: msolanol@ing-mat.udec.cl

DEPARTAMENTO DE INGENIERÍA MATEMÁTICA AND CI²MA, UNIVERSIDAD DE CONCEPCIÓN, CHILE
E-mail address: pvega@ing-mat.udec.cl