

DOMAIN DECOMPOSITION ALGORITHMS FOR $H(\text{CURL})$ PROBLEMS

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In this talk, we will discuss recent progress on developing domain decomposition algorithms for problems formulated in $H(\text{curl})$ and approximated by low order edge elements. We are focusing on self-adjoint positive definite model problems and are, in particular, interested in developing algorithms with a performance which is insensitive to large changes in the material properties.

All this work is carried out with Dr. Clark Dohrmann of the Sandia National Laboratories, Albuquerque, New Mexico.

A first technical report has appeared late last year, [1]. In that paper, condition number bounds of the form $C(1 + \log(H/h))^2$ were developed for problems in two dimensions. Here, C is a constant which is independent of the number of subdomains into which the given domain has been partitioned. This bound is also independent of arbitrary jumps in the two coefficients across the interface between the subdomains and it is also valid for quite irregular subdomain boundaries.

The goal of our work, now in progress, is to extend these results, to the extent possible, to the three dimensional case.

References

- [1] C. R. Dohrmann and O. B. Widlund, *An Iterative Substructuring Algorithm for Two-dimensional Problems in $H(\text{curl})$* , Department of Computer Science, Courant Institute, TR2010-936 (2010).