COMBINING MULTILEVEL PRECONDITIONERS WITH DOMAIN DECOMPOSITION FOR SOLVING LINEAR SYSTEMS

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Abstract

Algebraic multilevel techniques for defining preconditioners have proven to be very effective when used with Krylov methods. In most cases, they can solve linear systems arising from the dicretization of PDEs with a number of floating point operations proportional to the number of unknowns. To be efficient on parallel computers these multilevel techniques must use parallel smoothers. It has recently been suggested by several authors to use approximate inverses as smoothers. However, the construction of such approximate inverses, particularly those in product form, is not completely parallel.

In this paper, we propose to combine multilevel preconditioners with domain decomposition ideas to parallelize the construction phase of the smoothers. Numerical examples will show that these techniques are very efficient.

References

[1] G. MEURANT, *A multilevel AINV preconditioner.* to appear in Numerical Algorithms (2001).

[2] G. MEURANT, *Numerical experiments with algebraic multilevel preconditioners.* Electronic Transactions on Numerical Analysis, vol 12 (2001) pp 1–65.