A fast approximate hierarchical solver for dense linear systems

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Abstract

In this talk, we present the inverse fast multipole method as an approximate fast direct solver for dense linear systems, with a computational cost scaling linearly with the problem size [1]. The method can be used as a stand-alone direct solver or as a preconditioner in an iterative method. We use low-rank approximations to represent well-separated interactions; this is done in a multi-level fashion. Applications related to mesh deformation, Stokes flow, and acoustics are discussed.

Keywords: Fast direct solver; preconditioner; $\mathcal{H}^2$-matrices; low-rank compression.

References

[1] P. Coulier, H. Pouransari, and E. Darve The inverse fast multipole method: using a fast approximate direct solver as a preconditioner for dense linear systems. *arXiv* (2015), 1508.01835.