A Hybrid FMM-H^2-Matrix for Preconditioning Radial Basis Functions

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Kernel independent variants of the fast multipole method (FMM) have been used to perform the matrix-vector multiplication in iterative solvers for dense matrices that arise from radial basis functions. With the advent of techniques such as IFMM and inv-ASKIT, the analytical FMM now has similar capabilities to the algebraic H^2-matrices in the sense that they can be used to solve/precondition them. A major advantage of the analytical variants is their matrix-free nature, which allows them to handle much larger problem sizes for a given amount of memory. We demonstrate this capability using a couple of different radial basis functions.

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