An Adaption of Hierarchical Matrix on Explicit Group Iterative Poisson Solver

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Abstract: In this paper, an adaptive hierarchical matrix (H-matrix) explicit group iterative method based solution was proposed to solve two-dimensional Poisson problem with Dirichlet boundary condition. The finite difference approximation, specifically the Explicit Group method, was used to discretize the problem, which led to a system of linear equation. Two types of admissibility conditions, standard (s) and weak (w) are used to produces two different H-matrix structures, H_s- and H_w-matrix, respectively. The adaption of H-matrix to a linear system leads to reduce the memory size. Several experiments were conducted which compares the proposed H_w-matrix with the benchmarked H_s-matrix. The results showed the superiority of the proposed method when comparing both H-matrix structures.

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