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Efficient ghost cell reconstruction for embedded boundary methods[1] NARSIMHA RAPAKA, MOHAMAD AL-MAROUF, RAVI SAMTANEY, King Abdullah University of Science and Technology — A non-iterative linear reconstruction procedure for Cartesian grid embedded boundary methods is introduced. The method exploits the inherent geometrical advantage of the Cartesian grid and employs batch sorting of the ghost cells to eliminate the need for an iterative solution procedure. This reduces the computational cost of the reconstruction procedure significantly, especially for large scale problems in a parallel environment that have significant communication overhead, e.g., patch based adaptive mesh refinement (AMR) methods. In this approach, prior computation and storage of the weightage coefficients for the neighbour cells is not required which is particularly attractive for moving boundary problems and memory intensive stationary boundary problems. The method utilizes a compact and unique interpolation stencil but also provides second order spatial accuracy. It provides a single step/direct reconstruction for the ghost cells that enforces the boundary conditions on the embedded boundary. The method is extendable to higher order interpolations as well. Examples that demonstrate the advantages of the present approach are presented.

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