Parallel Implementation of Iterative Solvers

Consider the Helmholtz equation

\[ \nabla^2 u - u = \sin(\pi x) \sin(\pi y) \]

on a square domain with \( x \in [-1, 1] \) and \( y \in [-1, 1] \), where the origin is located at the center of the square.

- Use explicit spatial discretization of second-order and write a Jacobi and an SOR solver for it.
- Implement MPI based parallel algorithms for the Jacobi and SOR solvers and obtain speed up estimates, comparing the cost of serial to the parallel solutions. Perform experiments for 2, 4, 6, 8 and 16 processors on the IBM SP of CCASV and other parallel platforms that you may have access to.

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