Title: A non-overlapping DDM with PML transmission conditions and checkerboard partitions for Helmholtz problems

Abstract: It is well-known that the convergence rate of non-overlapping DDM applied to the parallel finite-element solution of large-scale time-harmonic wave problems strongly depends on the transmission condition enforced at the interfaces between the subdomains. Transmission operators based on perfectly matched layers (PMLs) have proved to be well-suited for configurations with layered domain partitions. However, the extension to more general partitions with cross-points (where more than two subdomains meet) is rather tricky and requires some care.
In this talk, I will present a non-overlapping substructured DDM with PML transmission conditions that takes cross-points into account for checkerboard domain partitions. In two dimensions, each subdomain is surrounded by PMLs associated to edges and corners. The continuity of Dirichlet traces at the interfaces between a subdomain and the surrounding PMLs is enforced with Lagrange multipliers. This coupling strategy offers the benefit of naturally computing Neumann traces, which allows to use the PMLs as discrete operators approximating the exact Dirichlet-to-Neumann maps. Two possible Lagrange multiplier finite element spaces are considered, and the behavior of the corresponding DDM is analyzed on several numerical examples.
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