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Application of Task Parallel Direct Solvers in Domain Decomposition Preconditioners

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Abstract: Sparse direct solvers play a key computational role in domain decomposition preconditioners. As the number of threads on newer computing platforms continues to increase, it is important for these solvers to effectively utilize them. In this talk, we present two different task-based approaches for sparse direct solvers. The first one is left-looking and uses OpenMP tasks for threading, while the second one is right-looking and uses the Kokkos library. Numerical results are presented to show the impact of the solvers on the performance of two parallel structural mechanics codes. For one of these codes, effective threading of the solve phase is shown to have the biggest impact.