Efficient preconditioning of hphp-FEM matrix sequences with slowly-varying coefficients -
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Efficient preconditioning of hphp-FEM matrix sequences with slowly-varying coefficients: An application to topology
optimization
We previously introduced a preconditioner that has proven effective for hphp-FEM discretizations of various challenging
elliptic and hyperbolic problems. The construction is inspired by standard nested dissection, and relies on the assumption
that the Schur complements can be approximated, to high precision, by Hierarchically-Semi-Separable matrices. The
preconditioner is built as an approximate LDMtLDMt factorization through a divide-and-conquer approach. This implies an
enhanced flexibility which allows to handle unstructured geometric meshes, anisotropies, and discontinuities. We build on
our previous numerical experiments and develop a preconditioner-update strategy that allows us handle matrix sequences
arising from problems with slowly-varying coefficients. We investigate the performance of the preconditioner along with the
update strategy in context of topology optimization of an acoustic cavity.

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