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Poster Abstract
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One of the challenges with high-order finite element and spectral element methods is that a global sparse matrix is no longer a good representation of a high-order linear operator, both with respect to the FLOPs needed for its evaluation and the memory transfer needed for a matrix-vector multiply. Thus, high-order methods require a new operator description that still represents a linear or non-linear operator. libCEED is an extensible library that provides a portable algebraic interface and optimized implementations suitable for high-order operators. libCEED's operator description is easy to incorporate in a wide variety of applications, without significant refactoring of the discretization infrastructure. We introduce the libCEED API, show performance results for the Center for Efficient Exascale Discretizations (CEED) benchmark problems, and introduce a Navier-Stokes solver using libCEED and PETSc, in which the composition and application of the different operators at the subdomain level, i.e. at the quadrature points that arise in discretizations with tensor product bases for spectral elements, is exploited.