

An optimal parallel-in-time preconditioner for parabolic optimal control problems

Sean Hon

Hong Kong Baptist University

In this talk, we propose a novel diagonalization-based preconditioner for the all-at-once linear system arising from the optimal control problem of parabolic equations. The proposed preconditioner is constructed using an ϵ -circulant modification of the rotated block diagonal preconditioning technique, which can be efficiently diagonalized via fast Fourier transforms in a parallel-in-time fashion. When the generalized minimal residual method is applied to the preconditioned system, we demonstrate that, with an appropriate choice of ϵ , the convergence rate achieves linearity, independent of the matrix size and the regularization parameter. This is joint work with Xue-Lei Lin and Po Yin Fung.