

Title: High-Order Multi-Grid-in-Time

Abstract: Parallel time-integration is a promising approach to accelerate the numerical simulation of time-dependent PDEs, harnessing the computational capability of modern supercomputers. To address the computational bottleneck that arises due to serial time integration, Multi-Grid Reduction in Time (MGRIT) is a parallel time-integration technique that operates on the entire time domain simultaneously using many processors, utilizing a hierarchy of time discretizations to relax to a final solution. A core component in a multi-level scheme is a coarse-grid residual estimation, which one uses to iteratively correct the desired fine(r) grid solution. In the present work, we replace the residual estimation within MGRIT with a residual estimation using deferred correction. This facilitates the computation of a final higher-order solution using MGRIT with negligible additional computational cost.