Ben O'Neill

Parallel in time multigrid for Nonlinear Problems

2210 Walnut St Apt 1
Boulder CO 80302
`ben.oneill@colorado.edu`
Jacob Schroder
Thomas Manteuffel

Standard sequential time marching schemes limit parallelism to the spacial domain. With computer architectures growing in size rather than clock speeds, additional speed-up must come from greater parallelism. We propose a multigrid reduction method that incorporates temporal parallelism into general timestepping routines, allowing for dramatic speed-ups on large architectures. For a nonlinear equation, each iteration of the parallel-in-time method requires an expensive, nonlinear, spatial solve. Using a simple nonlinear equation, with a Picard method as the nonlinear solver, we investigate several methods for reducing the computational cost of this spatial solve, including reducing solver accuracy on coarser levels and introducing spatial coarsening.