Parallel space-time methods for parabolic PDEs

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In this talk, we discuss some coupled space-time domain decomposition methods for solving unsteady problems. In traditional parallel methods for solving time dependent PDEs, the parallelism is obtained by partitioning the spatial mesh, the time integration is handled sequentially. When the number of time steps is large, there are lots of sequential steps, and when the number of processors is large, the sequential time integration part may become a bottleneck. We focus on some recently developed space-time overlapping Schwarz methods. After showing a new optimal convergence theory, we present some numerical experiments carried out on supercomputers with a large number of processors.