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Frontiers of Scientific Computing Lecture Series

**Space-time Multigrid Solvers for Extreme-scale Scientific Computing****Rob Falgout, Lawrence Livermore National Laboratory**

Computational Mathematician, Center for Applied Scientific Computing (CASC)

Digital Media Center 1034  
March 30, 2016 - 03:30 pm**Abstract:**

Multigrid methods are important techniques for efficiently solving huge systems and they have already been shown to scale effectively on millions of cores. However, one of the major challenges facing computational science with future architectures is that faster compute speeds will be achieved through greater concurrency (more cores), since clock speeds are no longer increasing. Current petascale computers already have millions of cores, but future exascale machines are expected to have billions. This immense degree of parallelism requires a similar level of concurrency in the algorithms that run on them. One consequence of this is that time integration by traditional time marching will become a sequential bottleneck.

In this talk, we will first introduce the multigrid method, discuss its essential features, and provide basic information on its benefits for parallel scientific computing. We will then discuss our efforts to develop multigrid methods for parallel time integration. The approach we use is based on multigrid reduction (MGR) techniques and has the advantage of being easily integrated into existing codes because it builds directly on the original time-stepping scheme. Results for a variety of applications will also be presented. LLNL-ABS-681196.

**Speaker's Bio:**

Rob Falgout is a computational mathematician in the Center for Applied Scientific Computing (CASC) at Lawrence Livermore National Laboratory (LLNL) and the project leader for the Scalable Linear Solvers Project and software effort, hypre. He earned his Ph.D. in Applied Mathematics at the University of Virginia in 1991 under the direction of James Ortega and joined Lawrence Livermore as a Postdoc that same year. Rob served on the editorial boards for the SIAM Journal on Scientific Computing and Numerical Linear Algebra with Applications. He has more than 25 years of experience developing parallel multigrid methods and software.

**This lecture has a reception @ 03:00 pm**