1154-65-1382 **Joseph Munar*** (joey.munar@rice.edu), **Isaiah Meyers** (isaiah.meyers@utexas.edu), **Tom Overman** (tom.overman@mavs.uta.edu) and **Eric Neville** (eric.neville@ucdconnect.ie). *A Parallel-in-Time Multigrid Approach to Constrained Optimization.*

Optimization problems in areas such as weather prediction, traffic flow, or resource allocation are often time dependent. Unfortunately, traditional sequential-in-time algorithms have become bottlenecks in solution model generation. As such, parallelization is a crucial requirement to achieve high-performance computing. The OMGrit algorithm is a parallel-in-time multigrid method designed to solve time-dependent constrained optimization problems. Further, OMGrit is able to optimize systems simultaneously coupled forwards- and backwards-in-time such as molecular systems and economic models. For quadratic problems, the algorithm solves the linear Karush-Kuhn-Tucker system of the optimization problem by decomposing the domain and performing a multigrid relaxation scheme to approximate the solution of the reduced system. This project introduces an extension of OMGrit to general nonlinear optimization problems and investigates the performance on both linear and nonlinear problems. Results show a promising level of speedup and robustness compared to more popular optimization solvers without any sacrifice in accuracy. (Received September 15, 2019)