1135-65-495 **Leo G. Rebholz**, **Alex Viguerie** and **Mengying Xiao*** (mengyix@clemson.edu), Clemson University, Clemson, SC 29634. *Efficient nonlinear iteration schemes based on algebraic splitting for the incompressible Navier-Stokes equations.*

We present new, efficient, nonlinear iteration methods for the incompressible Navier-Stokes equations. The methods are constructed by applying Yosida-type algebraic splitting to the linear systems that arise from grad-div stabilized finite element implementations of incremental Picard and Newton iterations. They are efficient because at each nonlinear iteration, the same symmetric positive definite Schur complement needs solved, which allows for CG to be used for inner and outer solvers, simple preconditioning, and reusing of preconditioners. For the incremental Picard-Yosida and Newton-Yosida iterations, we prove under small data conditions that the methods converge to the solution of the discrete nonlinear problem. Numerical tests are performed which verify excellent convergence properties of the methods on a variety of test problem. (Received September 06, 2017)