1125-VC-1847 **Benjamin D Ritz*** (ritzbd@clarkson.edu). *Hybrid Optimization for Mixed-Integer Nonlinear Problems via a Genetic Algorithm and Implicit Filtering.*

Many design problems in engineering and the sciences can be posed as mixed-integer nonlinear programming (MINLP) problems, requiring both real-valued variables and integer variables. This formulation is non-differentiable. A binary genetic algorithm (GA) is one derivative-free method that could be applied. However, GAs are weak on a local scale and can require many function evaluations to identify an optimum. To address this weakness, hybrid optimization can be used. Hybrid optimization involves combining methods to capitalize on the strengths of each method while attempting to overcome weaknesses in functionality. This work explores the hybridization of a genetic algorithm with implicit filtering, which expands the capabilities of implicit filtering to MINLP problems. Implicit filtering is a derivative-free optimization method for solving noisy problems that uses an adaptive stencil to approximate the gradient of the objective. We demonstrate the hybrid algorithm on a suite of test problems and an application to simulation-based modeling in water resources. In addition, sensitivity analysis is performed on optimization parameters to examine problem-dependent parameter selection. (Received September 19, 2016)