
Matthew Parno
**A Framework for Particle Swarm Optimization with
Surrogate Functions**

Box 6996
Clarkson University
Potsdam
NY 13699
`parnomd@clarkson.edu`
K.R. Fowler
T. Hemker

Particle swarm optimization (PSO) is a population-based, heuristic minimization technique that is based on social behavior. The method has been shown to perform well on a variety of problems including those with nonconvex, non-smooth objective functions with multiple local minima. However, the method can be computationally expensive since many function calls are required to advance the swarm at each optimization iteration. This is a significant drawback when function evaluations depend on output from an off-the-shelf simulation program, which is often the case in engineering applications. To this end, we propose a hybrid algorithm incorporating low fidelity surrogate functions that serve as a more efficient information sharing medium. Numerical results are given that show the hybrid approach can improve algorithmic efficiency in a number of test problems including a difficult hydraulic capture problem.