



Function approximation global optimization algorithms for calibration of expensive simulations with applications to water resources

Christine A. Shoemaker, Rommel Regis, and Pradeep Mugunthan

School of Civil and Environmental Engineering and School of Operations Research, Cornell University, Ithaca, NY 14850, USA, [cas12@cornell.edu; 607-255-9004]

Calibration of water resource models requires repeated simulations of the model to identify the set or sets of parameter values that yield the best fit to the data. This can be done by trial and error, but optimization methods can usually find better solutions with less computation. However, even with optimization methods, it is difficult to find good solutions for nonlinear models in a reasonable amount of computer time if the time to simulate the model once is long (e.g. over 30 minutes) and the problem requires global optimization because of multiple local minima. We will present new methods for global optimization of computationally expensive simulations models. The methods utilize radial basis functions for approximation of the simulation model output and an algorithm that considers locations of previously evaluated sets of parameters. Numerical comparisons with other algorithms will be given for a number of global optimization test functions and for several water resources examples.