

Computer-Based Model Calibration R&D at the U.S. Army Engineer Research and Development Center

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The seminar will summarize some recent, current, and planned research and development activity at the U.S. Army Engineer Research and Development Center (ERDC) directed to the topic of computer-based model calibration. An important consideration in assessing the performance of model calibration software is that of run time. Minimizing the number of (hydrologic) model runs required during the calibration process is nearly always important, but particularly when the objective function landscape contains multiple local minima or (hydrologic) model run times are high. Minimizing the number of required model runs is one of the primary factors driving the research and development activity, such that the resulting tool(s) are more compatible with the computationally expensive physics-based models that are becoming more commonly used within the practice community. Topics to be discussed include, among others, an accelerated derivative-based local search algorithm, a stochastic global optimization algorithm for intelligently sifting through local minima to find a global minimum, an efficiency enhancement to a state-of-the-art evolution strategy which uses a local function approximation to the objective function surface, local function approximation-based efficiency enhancements adapted to a state-of-the-art Bayesian model uncertainty analysis method, and an observed opportunity to potentially improve upon the efficiency of an adaptive regularization method.