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Optimal Groundwater Remediation Design

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We describe how optimization algorithms can aid in the decision making process of cleaning up a contaminated groundwater site. These problems are challenging in that optimization is simulation based and often gradient information is not available. Objectives functions and constraints can be nonsmooth, nonconvex, and discontinuous and we are investigating the use of sampling methods on this class of problems. We describe a contaminant plume capture problem proposed in the literature for benchmarking purposes for the optimization community and present numerical results obtained with a sampling method called implicit filtering. Implicit filtering follows a projected quasi-Newton method using finite difference gradients and reduces the difference increment as the optimization progresses.