

CE 597D Water Resources Seminar
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Stavely Conference Room —202 Hammond Building
12pm-1pm

Multiobjective Groundwater Monitoring Design: A Case Study using e-NSGA-II

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Monitoring design is a problem of paramount importance within water resources because environmental observation data provide the sole means of assessing if engineered systems are successfully protecting human and ecologic health. The monitoring design problem is extremely challenging because it requires environmental engineers to capture an impacted system's governing processes, elucidate human and ecologic risks, limit monitoring costs, and satisfy the interests of multiple stakeholders (e.g., site owners, regulators, and public advocates). Evolutionary multiobjective optimization (EMO) has tremendous potential to help resolve these issues by providing environmental stakeholders with a direct understanding of their monitoring tradeoffs. This talk introduces and discusses the application of the Nondominated Sorted Genetic Algorithm-II to optimize groundwater monitoring networks for conflicting objectives. Additionally, a new EMO algorithm, e-NSGA-II, is presented which uses the concepts of e-dominance archiving and automatic parameterization techniques. Results are presented for 2-objective and 4-objective groundwater monitoring case studies in which the archiving and parameterization techniques for the NSGA-II combined to reduce computational demands by 70-percent relative to prior published results. The algorithm can be easily generalized to other multiobjective applications to minimize computational times as well as trial-and-error parameter analysis.

Moderator: Yong Tang

Refreshments: Soumya Chennapragada

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