Computational and Applied Mathematics Seminar

Speaker

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Exploiting Structure in Derivative-Free Nonlinear Optimization

Abstract:
The advent of computational science has unveiled large classes of nonlinear optimization problems where derivatives of the objective and/or constraint functions are unavailable. Often, these problems are posed as black-box optimization problems, but rarely is this by necessity. We report on our experience extracting additional structure on problems consisting of both black-box and algebraic or otherwise known components. We provide diverse examples of such local optimization problems that are being solved at Argonne National Laboratory, including nonlinear least squares, robust optimization, and other forms of composite nonsmooth optimization. In each case, we use quadratic or RBF surrogates to locally model both the black-box and algebraic components and obtain new, globally convergent "grey-box" optimization methods.
Joint work with Jeff Larson and Matt Menickelly.