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A Matrix-Free Regularized Sequential Quadratic Optimization Method

When formulated appropriately, augmented Lagrangian methods require the solution of a symmetric quasi-definite linear system at each iteration. The latter are indefinite but their strong relationships with definite systems enable specialized linear algebra and make them prime candidates for matrix-free implementations. We illustrate how the adequately-formulated augmented Lagrangian method for equality-constrained problems provides the motivation for regularized sequential quadratic optimization. We present an efficient matrix-free implementation for large-scale problems, describe global and fast local convergence results, and report on numerical experiments. We conclude with comments on extensions to inequality constraints. This is joint work with S. Arreckx.