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*Methods for Degenerate Optimization Problems with Rapid Local Convergence.*

We describe and analyze new methods for degenerate nonlinear optimization problems. For the problems with inequality constraints, we do not assume the strict complementarity condition, constraint qualifications and second-order sufficient conditions for optimality. In this case, the system of optimality conditions might be singular at the solution. In a local neighborhood of the solution, we construct a modified Lagrange system that has a locally unique regular solution. By applying Newton's method to the Lagrange system, we get a method with a superlinear rate of convergence to the solution of the nonlinear optimization problem. The proposed approach can be applied to solving a variety of problems and requires weaker assumptions for local superlinear convergence than other existing methods. (Received February 14, 2006)