

Interior-Point ℓ_2 -Penalty Methods for Nonlinear Programming: Global and Local Convergence

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Abstract: We propose a line search primal-dual interior-point method that approximately solves a sequence of equality constrained barrier subproblems. To attain feasibility it forces an ℓ_2 exact penalty to zero whenever the steps generated tend to zero. Under standard assumptions, our method has strong global and local convergence properties. Specifically, any limit point of the iteration sequence is either a Karush-Kuhn-Tucker point of the problem (as long as Mangasarian-Fromovitz constraint qualification holds), or a Fritz-John point of the feasibility problem. Moreover, if a linear independent constraint qualification and second-order sufficient conditions hold at such a limit point, then the rate of convergence is locally Q-superlinear. Numerical results will be presented to illustrate these properties and the effectiveness and robustness of the method.

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