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不等式约束优化一个新型可行QP-free算法

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A NEW TYPE FEASIBLE QP-FREE ALGORITHM FOR INEQUALITY CONSTRAINED OPTIMIZATION

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- 摘要
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摘要 本文对非线性不等式约束优化问题提出了一个新的可行 QP-free 算法. 新算法保存了现有算法的优点, 并具有以下特性: (1) 算法每次迭代只需求解三个具有相同系数矩阵的线性方程组, 计算量小; (2) 可行下降方向只需通过求解一个线性方程组即可获得, 克服了以往分别求解两个线性方程组获得下降方向和可行方向, 然后再做凸组合的困难;(3) 迭代点均为可行点, 并不要求是严格内点; (4) 算法中采用了试探性线搜索,可以进一步减少计算量; (5) 算法中参数很少,数值试验表明算法具有较好的数值效果和较强的稳定性.

关键词: 约束优化 QP-free算法 线性方程组 全局收敛 超线性收敛

Abstract: In this paper, a new feasible QP-free algorithm for solving the nonlinear optimization problems with inequality constraints is presented. It reserves all the advantages of previous algorithms, and the interesting features of the algorithm are summarized as follows: (1) At each iteration, only three systems of linear equations with the same coefficient matrix need to be solved, which decreases largely the amount of computations; (2) A feasible descent direction can be obtained by solving only one system of linear equations, while the previous algorithms need to solve one linear system to get a feasible direction and another one to obtain a descent direction, and an improving direction is obtained by doing a convex combination; (3) The iteration points are all feasible without requiring to be strictly interior points; (4) The exploratory line search is introduced to the algorithm, and the computational cost can be further reduced; (5) The parameters in the proposed algorithm are few, and some numerical results illustrate that the proposed algorithm is efficient and stable.

Key words: constrained optimization QP-free algorithm system of linear equations global convergence superlinear convergence

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