Acta Mathematica Sinica, English Series 2007 23 (7): 1233-1240 ISSN: 0583-1431 CN: 11-1914/R

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The Global Convergence of Self-scale BFGS Algorithm with Nonmonotone Line Search for Unconstrained Nonconvex Optimization Problems

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收稿日期 2004-12-7 修回日期 网络版发布日期 2007-5-21 接受日期 2005-4-18

摘要

关键词 nonmonotone line search self-scaling BFGS method global convergence

分类号 90C26

The Global Convergence of Self-scale BFGS Algorithm with Nonmonotone Line Search for Unconstrained Nonconvex Optimization Problems

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Abstract The self-scaling quasi-Newton method solves an unconstrained optimization problem by scaling the Hessian approximation matrix before it is updated at each iteration to avoid the possible large eigenvalues in the Hessian approximation matrices of the objective function. It has been proved in the literature that this method has the global and superlinear convergence when the objective function is convex (or even uniformly convex). We propose to solve unconstrained nonconvex optimization problems by a self-scaling BFGS algorithm with nonmonotone linear search. Nonmonotone line search has been recognized in numerical practices as a competitive approach for solving large-scale nonlinear problems. We consider two different nonmonotone line search forms and study the global convergence of these nonmonotone self-scale BFGS algorithms. We prove that, under some weaker condition than that in the literature, both forms of the self-scaling BFGS algorithm are globally convergent for unconstrained nonconvex optimization problems.

Key words nonmonotone line search self-scaling BFGS method global convergence

DOI: 10.1007/s10114-005-0837-5

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