

一类凸优化的混合下降算法

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A HYBRID DESCENT ALGORITHM FOR CONVEX MINIMIZATION

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摘要 邻近点算法(PPA)是一类求解凸优化问题的经典算法,但往往需要精确求解隐式子问题,于是近似邻近点算法(APPA)在满足一定的近似规则下非精确求解PPA的子问题,降低了求解难度.本文利用近似规则的历史信息和随机数扩张预测校正步产生了两个方向,通过随机数组合两个方向获得了一类凸优化的混合下降算法.在近似规则满足的情况下,给出了混合下降算法的收敛性证明.一系列的数值试验表明了混合下降算法的有效性和效率性.

关键词: 凸优化问题 混合下降算法 邻近点算法 近似邻近点算法

Abstract: The proximal point algorithm (PPA) is a classical method for solving convex minimization, which frequently finds an exact solution of implicit subproblems. To reduce the difficulty and complexity in computing implicit subproblems, the approximate proximal point method(APPA) establishes an approximate solution of implicit subproblems under some approximate rules. In this paper, two directions were designed by making greater use of historical information of approximate rules and the prediction-correction step length extension with the random number series, and a hybrid descent method(HD Method) for convex minimization was developed through convex combinations of the two directions with the random number series. Subsequently we established the strong convergence of HD method for convex minimization under some approximate rules. Moreover, it is also worth noting that the efficiency of HD method is confirmed through a series of numerical experiments.

Key words: Convex minimization hybrid descent method proximal point method approximate proximal point method

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