应用数学与计算数学学报
Communication on Applied Mathematics and Computation

应用数学与计算数学学报 » 2012, Vol. 26 » Issue (1) :45-52 DOI:

不定最小二乘问题的改进的不完全双曲Gram-Schmidt预处理算法

Preconditioners for indefinite least square problems based on incomplete hyperbolic modified Gram-Schmidt

摘要 应用改进的不完全双曲Gram-Schmidt (IHMGS)方法预处理不定最小二乘问题的共轭梯度法(CGILS)、 正交分解法(ILSQR)与广义的最小剩余法(GMRES)等迭代算法来求解大型稀疏的不定最小二乘问题. 数值实验表明， IHMGS预处理方法可有效提高相应算法的迭代速度，且当矩阵的条件数比较大时，效果更加显著.

关键词： 不定最小二乘(ILS)问题 改进的不完全双曲Gram-Schmidt (IHMGS) 最小二乘问题的共轭梯度法(CGILS) 最小二乘问题正交分解法(ILSQR) 广义的最小剩余法(GMRES) 预处理

Abstract: Some iterative methods such as the conjugate gradient method for the indefinite least square problems (CGILSs), the sparse linear equations and indefinite least square problems (ILSQRs), and the generalized minimal residual (GMRES) method are preconditioned by the incomplete hyperbolic modified Gram-Schmidt (IHMGS) for the solution of the large and sparse indefinite least square problem. Numerical experiments show that the IHMGS preconditioner can greatly improve the iterative speed, especially for large-scale and ill-conditioned problems.

Keywords: indefinite least square (ILS) problem, incomplete hyperbolic modified Gram-Schmidt (IHMGS), conjugate gradient method for indefinite least square problem (CGILS), sparse linear equation and indefinite least square problem (ILSQR), generalized minimal residual (GMRES), preconditioner

收稿日期: 2011-04-20;

基金资助:

国家自然科学基金资助项目(11001167);上海市重点学科建设资助项目(J50101)

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引用本文:

李献娟, 刘巧华 .不定最小二乘问题的改进的不完全双曲Gram-Schmidt预处理算法[J] 应用数学与计算数学学报, 2012,V26(1): 45-52

LI Xian-Juan, LIU Qiao-Hua .Preconditioners for indefinite least square problems based on incomplete hyperbolic modified Gram-Schmidt[J] Editorial By Communication On Applied Mathematics , 2012,V26(1): 45-52

链接本文:

http://202.120.127.195/shu_yyyjs/CN/ 或 http://202.120.127.195/shu_yyyjs/CN/Y2012/V26/I1/45

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