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应用数学与基础数学

Banach空间上相容算子方程的最小范数解的扰动分析

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摘要 设~X, Y~是~Banach~空间, ~T~是\ $\mathcal{D}(T)\subset X$~%到\ Y~的稠定闭线性算子而且它的值域在\ Y~闭.
~设相容算子方程~$Tx=b$~的非相容 扰动为\ $ \|(T+\delta T)x-\bar b\|=\min\limits_{z\in\mathcal{D}(T)}\|(T+\delta T)z-\bar b\|, $~%
这里\ δT~是\ $X\to Y$~的有界线性算子. ~在某些条件下\ (比如\ $X, \, Y$~是自反的), ~设上述方程的最小范数 解为\ $\bar x_m$, 并 设\ $Tx=b$~的解集\ $S(T, b)$~中的最小范数解为\ x_m. ~本文给出了当\ $\delta(\Ker T, \Ker(T+\delta T))$~较小时, $\dfrac{\dist(\bar x_m, S(T, b))}{\|x_m\|}$~的上界估计式.

关键词 闭值域 约化最小模 最小范数解

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Perturbation analysis for the minimal norm solution of the consistent operator equation in Banach spaces(Chinese)

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Abstract

Let~X, Y~ be Banach spaces and let T be a densely--defined closed linear operator from $\mathcal{D}(T)\subset$ to Y with closed range. Suppose the non-consistent perturbation of the consistent equation $Tx=b$ is $ \|(T+\delta T)x-\bar b\|=\min\limits_{z\in\mathcal{D}(T)}\|(T+\delta T)z-\bar b\|, $ where δT is a bounded linear operator from X to Y. Under certain conditions (e. g. X and Y are reflexive Banach spaces), let $\bar x_m$ be the minimal norm solution of above equation and let x_m be minimal norm solution of the set $S(T, b)=\{x\in\mathcal{D}(T)\vert\, Tx=b\}$. In this paper, we give an estimation of the upper bound of $\dfrac{\dist(\bar x_m, S(T, b))}{\|x_m\|}$ when $\delta(\Ker T, \Ker(T+\delta T))$ is small enough.

Key words closed range reduced minimum modulus minimal norm solution

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