

多相流和计算流体力学

一种用于在线测量的电容层析成像图像重建算法

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摘要 提出了一种新的、快速的电容层析成像算法。在分析极小范数解的基础之上针对ECT逆问题的特点对其进行改进, 并利用奇异值分解定理证明这种改进的数值稳定作用, 从而从极小范数解的角度解决了ECT逆问题数值解的唯一性和稳定性问题; 在此基础上从最优化的角度推导出进一步提高重建图像质量的公式; 数值实验表明这种改进是有效的, 其图像重建时间近似LBP, 然而成像质量比LBP、Tikhonov和Landweber迭代法要好。

关键词

分类号

An image reconstruction algorithm applicable to on-line electrical capacitance tomography

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Abstract

A novel fast algorithm for electrical capacitance tomography (ECT) was presented. The minimum norm solution was improved according to the nature of the inverse problems of ECT, and the stability of the numerical solution for the improvement was proved via the singular value decomposition principle. Some equations for further improvement of the reconstructed image were deduced by numerical optimization. Numerical experiments indicated that the improvement was efficient and the time of image reconstruction was similar to that of linear back-projection (LBP), however, the quality of the reconstructed image is better than other image reconstruction algorithms such as LBP, Tikhonov and Landweber algorithm.

Key words

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