Abstract

This paper analyses the performance of grey level fitting mechanism based on Gompertz function used in Electrical Capacitance Tomography measurement system. In order to evaluate its performance, the data fitting mechanism has been applied to common image reconstruction algorithms which include; Linear Back Projection, Singular Value Decomposition, Tikhonov Regularization, Iterative Tikhonov Regularization, Landweber iteration and Projected Landweber iteration. Images were reconstructed using measured capacitance data for annular and stratified flows, and qualitative and quantitative evaluation were done on the reconstructed images in comparison with respective reference images. Results show that this grey level fitting mechanism is better in terms of improving image spatial resolution, minimizing relative image error and distribution error and maximizing correlation coefficient.

References

- Yang W Q and Peng L 2003 Image reconstruction algorithms for electrical capacitance
Performance Analysis of Grey Level Fitting Mechanism based Gompertz Function for Image Reconstruction Algorithms in Electrical Capacitance Tomography Measurement System

- Isaksen Ø 1996 A review of reconstruction techniques for capacitance tomography Meas. Sci. Technol. 7 325
- Chandrasekera T and Wang A 2012 A comparison of magnetic resonance imaging and electrical capacitance tomography: An air jet through a bed of particles Powder Technol. 227 86–95
- Thorn R 1997 Recent developments in three-phase flow measurement Meas. Sci. Technol. 8 691

- Hua Yan, Chunting Liu and Jing Gao 2004 Electrical capacitance tomography image reconstruction based on singular value decomposition Fifth World Congress on Intelligent Control and Automation (IEEE Cat. No. 04EX788) vol 4 (IEEE) pp 3783–6
- Wang H, Tang L and Cao Z 2007 An image reconstruction algorithm based on total
variation with adaptive mesh refinement for ECT Flow Meas. Instrum. 18 pp. 262–7
  - Björck A 1996 Numerical methods for least squares problems (Siam)
  - Nombo J 2014 A Grey Level Fitting Mechanism based on Gompertz Function for Two
    Appl. 101 7–12
    "Nauka"; Main Ed. Phys. Math. Lit. 293
  - Fletcher R 2013 Practical methods of optimization (John Wiley & Sons)
  - Isaksen Ø and Nordtvedt J E 1994 An implicit model based reconstruction algorithm for
    use with a capacitance tomography system Proc. European Concerted Action on Process
    Tomography, Oporto pp 215–26
    capacitance tomographic flow imaging systems using physical models Circuits, Devices and
    Systems, IEE Proceedings- vol 141 (IET) pp 357–68

**Index Terms**

Computer Science

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Gompertz function.