

Entropic Thresholding Methods in Reconstruction of Capacitance Tomography Data

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Abstract

High quality reconstruction of capacitance tomography data is of vital importance for the extraction of quantitative information from such systems. The use of such soft-field sensor systems and the LBP reconstruction algorithm produces distortions in the reconstructed tomogram data (i.e. the true intensity values and their location in the tomogram under consideration are corrupted or altered). The main problem with LBP reconstruction algorithm is a smearing effect of sharp transitions in the dielectric constants. Several authors have suggested different approaches for improving the quality of the reconstructed tomogram. The quality of the generated tomograms could be improved by including a thresholding procedure in the reconstruction process for the purpose of minimising these distortions. Here, the use of global entropic thresholding methods in the reconstruction process of capacitance tomography data is reported. The results obtained are compared to the previously published thresholding methods of Xie et al. (1992) and an Implicit Model based reconstruction. It is concluded that distortions in the reconstructed capacitance tomograms can be minimised by using a thresholding procedure. It can be seen that the evaluated global entropic thresholding methods without supervision cannot be used to produce reasonably accurate results when it comes to multicomponent flow imaging. The smearing effect of the LBP reconstruction algorithms blur the phase transition making it hard for autothresholding, particularly for small objects. This effect is more pronounced when the two components under investigation have a small difference in permittivity