

International Journal of Biomedical Imaging

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Research Article

A Fast Reconstruction Algorithm for Fluorescence Optical Diffusion Tomography Based on Preiteration

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Abstract

Fluorescence optical diffusion tomography in the near-infrared (NIR) bandwidth is considered to be one of the most promising ways for noninvasive molecular-based imaging. Many reconstructive approaches to it utilize iterative methods for data inversion. However, they are time-consuming and they are far from meeting the real-time imaging demands. In this work, a fast preiteration algorithm based on the generalized inverse matrix is proposed. This method needs only one step of matrix-vector multiplication online, by pushing the iteration process to be executed offline. In the preiteration process, the second-order iterative format is employed to exponentially accelerate the convergence. Simulations based on an analytical diffusion model show that the distribution of fluorescent yield can be well estimated by this algorithm and the reconstructed speed is remarkably increased.