

Reconstruction of Magnetic Susceptibility Distribution by Extracting Streaking Artifacts

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ABSTRACT

Quantitative susceptibility mapping (QSM) is a novel imaging modality in the field of Magnetic Resonance Imaging (MRI), which is expected to be effective in diagnosing diseases in a brain such as Alzheimer's disease and Parkinson's disease. The visualization of magnetic susceptibility distribution of the human body from the measured relative difference field in an MR machine can be achieved by solving the corresponding inverse problem that is approximately expressed by the convolution of the susceptibility distribution with the magnetic field generated by a unit dipole. This presentation presents the existence and uniqueness of the inverse problem and the characterization of the streaking artifacts, the well-known result of the ill-posedness of the inverse problem caused by the zeroes of the kernel in Fourier domain. Finally, we will discuss the possible reconstruction methods which are based on the mathematical characterization of the streaking artifacts in the reconstructed image.