Motion Compensation for Magnetic Particle Imaging using an FFL-Scanner

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Reliable and fast medical imaging techniques are indispensable for diagnostics in clinical everyday life. One promising example is magnetic particle imaging (MPI) invented by Gleich and Weizenecker [1]. The aim is to recover the spatial distribution of magnetic nanoparticles injected into the patient's blood vessels for visualization of the blood flow. To this end, the particles' non-linear magnetization response to changing magnetic fields is exploited. We restrict ourselves to MPI using a field-free line (FFL) for spatial encoding [2]. For data acquisition the FFL is moved through the field of view resulting in a scanning geometry resembling the one in computerized tomography. Indeed, in the ideal setting, corresponding MPI data can be traced back to the Radon transform of the particle concentration [3]. The dynamic setting is more delicate and requires an adaption of the MPI signal equation. We build a link to an adapted version of the Radon transform used in dynamic CT [4] and conclude with reconstruction results by means of total variation regularization for simulated dynamic data.

References

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