Docket #: S11-114

An Apparatus for Real-Time Phase Correction for Diffusion-Weighted Magnetic Resonance Imaging Using Adaptive RF Pulses

Patient motion during magnetic resonance imaging (MRI) is a significant source of image degradation and artifacts. This invention addresses this limitation in MRI. Stanford researchers have developed a novel apparatus that can measure and correct spatially non-linear phase errors in real time via phase-compensating, multi-dimensional adaptive RF pulses. This invention expands the applicability of diffusion-weighted imaging from primarily single-shot echoplanar imaging (EPI) to spatially less distorted acquisition methods, such as Fast Spin Echo (FSE). This invention can be also used to correct and prevent non-linear phase-errors prior to image readouts, such as EPI, and avoids the need for phase correction during image reconstruction as well as mitigates errors from partial Fourier reconstructions. This apparatus is not vendor-specific and can be implemented on MR units with a real-time operating system.

Applications

- Diffusion-weighted MRI with FSE/turboSE or diffusion-weighted driven-equilibrium (balanced) SSFP, diffusion-weighted (interleaved) EPI, diffusion-weighted PROPELLER/BLADE
- Phase-errors in Chemical shift MRI

Advantages

- Allows **accurate, real-time** correction of motion-induced phase errors using adaptive RF pulses
- **Adaptable** to many commercial MRI systems

Publications

- Bammer, R., Holdsworth, S.J., Aksoy, M., Skare, S.T. Phase Errors in Diffusion-Weighted Imaging in Diffusion MRI: Theory, Methods, and Applications. Oxford University Press, 2010.
- Van A, Hernando D, Sutton B. "Motion-Induced Phase Error Estimation and Correction for 3D Diffusion Tensor Imaging. IEEE Trans Med Imaging. 2011

Patents

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