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Anisotropic phantom to calibrate high-q diffusion MRI methods

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Abstract

A silicon oil-filled glass capillary array is proposed as an anisotropic diffusion MRI phantom. Together with a computational/theoretical pipeline these provide a gold standard for calibrating and validating high-q diffusion MRI experiments. The phantom was used to test high angular resolution diffusion imaging (HARDI) and double pulsed-field gradient (d-PFG) MRI acquisition schemes. MRI-based predictions of microcapillary diameter using both acquisition schemes were compared with results from optical microscopy. This phantom design can be used for quality control and quality assurance purposes and for testing and validating proposed microstructure imaging experiments and the processing pipelines used to analyze them.

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