O-Space imaging: a novel method for accelerated magnetic resonance data acquisition

**Description:**

Yale University investigators have developed a new MR imaging method that accelerates image acquisition beyond conventional and parallel imaging methods. Rather than using linear encoding gradients as employed by current parallel imaging methods, O-space imaging utilizes nonlinear fields as encoding gradients and eliminates phase encoding. Since the spatial encoding gradient shapes are tailored to an existing surface coil array, more efficient use is made of the spatial information in the coil profiles. As an added benefit, nonlinear gradients may be ramped faster than linear gradients, further reducing image acquisition times.

**Value Proposition:** Magnetic resonance imaging (MRI) has become one of the most clinically important medical imaging modalities. While early clinical applications required scan times of hours, improvements in hardware and pulse sequences brought about significantly reduced imaging times. When further reductions in imaging speed were limited by the physiological effects of rapidly switched field gradients, parallel imaging methods were developed to accelerate MR data acquisition. However, improvements in parallel imaging require the use of greater numbers of independent surface coils, leading to increased coil-coil interference, and significantly greater hardware expense.

Further acceleration of imaging times remains desirable. Shorter imaging times enhance patient comfort and lead to greater patient compliance, lessening the likelihood of repeat scans. Shorter imaging times also lead to greater patient throughput and ultimately increased efficiency for MRI centers.

**Advantages:** Very high acceleration factors are possible with O-space imaging, beyond those achievable by current parallel imaging approaches. This approach is also very general and can be applied to almost any imaging application, pulse sequence, and anatomical region.

**IP Status:** U.S. provisional patent application pending.

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