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Direct current coil designs for a portable magnetic resonance scanner

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Magnetic resonance imaging (MRI) is a powerful non-invasive imaging technique with high resolution and excellent soft tissue contrast. However, access to MRI is limited by the high instrument cost and high maintenance cost. Current scanners cannot be easily relocated because of their size and weight. A low cost, portable scanner will enable point-of-care diagnosis as well as other industrial applications such as agriculture disease screening.

In MRI experiments, a highly homogenous static magnetic field is required to ensure image quality, which is usually achieved by the direct current (DC) shimming coils. Magnetic field gradients are generated by DC gradient coils for spatial encoding. The portable magnetic resonance scanner requires novel DC coils due to the unconventional single-sided configuration. The magnetic field distribution, heat dissipation and volume constraint must be considered in the design. Recent development on shimming and gradient coils for a portable magnetic resonance scanner and future applications will be presented.

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