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Oval gradient coils for an open magnetic resonance imaging system with a vertical magnetic field

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Abstract

Existing open magnetic resonance imaging (MRI) systems use biplanar gradient coils for the spatial encoding of signals. We propose using novel oval gradient coils for an open vertical-field MRI. We designed oval gradients for a 0.3 T open MRI system and showed that such a system could outperform a traditional biplanar gradient system while maintaining adequate gradient homogeneity and subject accessibility. Such oval gradient coils would exhibit high efficiency, low inductance and resistance, and high switching capability. Although the designed oval Y and Z coils showed more heat dissipation and less cooling capability than biplanar coils with the same gap, they showed an efficient heat-dissipation path to the surrounding air, which would alleviate the heat problem. The performance of the designed oval-coil system was demonstrated experimentally by imaging a human hand.

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