

Abstract Submitted
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Use of Exotic Coordinate Systems in the Design of RF Resonators for High-Field MRI EDWARD BUTTERWORTH, Texas A&M University-Kingsville — High field human MRI (11.7 Tesla is FDC approved for human research) renders standard RF coil design inadequate because the resonant wavelength in human soft tissue (about 8 cm at 500 MHz) is significantly smaller than the physical size of the human body. I propose optimizing the design of such RF coils using coordinate systems appropriate to human body parts, as has been done with elliptical¹ and Cassinian oval² cross sections. I have computed analytically the magnetic fields produced by a device of toroidal cross section using a cascade of conformal transformations.³ Building upon these efforts, I will use the eleven coordinate systems of Moon & Spencer,⁴ along with other possible coordinate systems and conformal transformations, to identify a small number of configurations that have the highest probability of being useful as RF coil designs for ultrahigh-field MRI.

¹Crozier et al, *Concepts Magn Reson* 1997; **9**:195-210.

²De Zanche et al, *Magn Reson Med* 2005; **53**:201-211.

³Butterworth & Gore, *J Magn Reson* 2005; 175:114-123.

⁴Moon & Spencer, *Field Theory Handbook*, Berlin: Springer-Verlag; 1971.

Edward Butterworth
Texas A&M University-Kingsville

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