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Tue-Mo-Po2.06-09 [40]: On the Accurate Calculating of Coil-tissue Interactions for Ultra-high Field MRI RF Coils Using a Hybrid MoM/FDTD Algorithm

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In ultra-high field magnetic resonance imaging (MRI) systems, the wavelength of the radiofrequency (RF) field is comparable to the size of imaging object, thus causing complicated coil-tissue interactions, which can lead to detrimental changes of the magnetic field (B1 field) and thermal intensity in human tissue. However, the homogeneity of B1 field and safety is critical for the RF coil, which generate the need of accurate calculating for B1 field as well as specific absorption rate (SAR). In this paper, a huygence equivalent surface based hybrid method of moments (MoM) and finite-difference time-domain (FDTD) algorithm is used to calculate the B1 field and SAR for high frequency RF coils loaded with the human tissue. The frequency of 298MHz (7T),400MHz (9.4T) and 500MHz (11.75T) are simulated individually. Different kinds of RF coils are also modeled to achieve the best performance in separate frequencies. In addition, a well established finite element method (FEM) is also used to calculate the same problem as the hybrid method, which demonstrate the feasibility and superiority of MoM/FDTD technique. The results shown in this article may contribute to the fabrication of better RF coils.

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