

Aufgabe der Abschlussarbeit im ISE Masterstudiengang

für: Herrn Okechukwu Ephraim **Anyaegbu**

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Thema: **Investigation of Transmit/Receive Coil for 7-Tesla
Magnetic Resonance Tomograph (MRT)**

Description:

Our research project “7-Tesla MRT Ganzkörperspule” aims at the development of an array of coils (antennas) which can be electronically steered in phase and amplitude in order to compensate inhomogeneous field distributions inside the patient body. One work package requires the design of compact stripline coils which produce strong RF magnetic fields at a frequency of 300 MHz and can be used in a closely spaced array.

A new coil design has been realized which employs an air-microstrip transmission line as the coil. Preliminary measurements have shown high magnetic near fields and considerable far field radiation. The thesis task is to model the coil design and perform field theoretical investigations of near- and far-field distributions using the “EMPIRE” electro-magnetic simulator.

In particular the task is to

- build a CAD model of the existing microstrip coil design together with a simple phantom in close proximity using the “EMPIRE” field theoretical simulator,
- investigate the electric and magnetic field distribution in front of the coil and in reverse direction; evaluate the SAR distribution in the phantom and the circular-polarized field components,
- investigate the far-field patterns and radiation gain of the coil,
- investigate ground plane effect by varying the ground plane size and analyzing the current distributions,
- investigate the Q-factor of the coil as a function of the phantom distance,
- investigate the mutual coupling of a pair of coils side by side in close distance.

At the end of the thesis work, a public presentation of the results has to be given.