Defense Announcement

RF SHIMMING IMPACTS ON RF-INDUCED HEATING FOR MEDICAL IMPLANTS AT 3T

Qi Zeng

Degree: **PhD, Electrical Engineering**

Date: 05/08/2017 Time: 10:00am

Location: ECE conference room

Committee Chair: Ji Chen

Committee Members: David R. Jackson
Driss Benhaddou
Nikolaos V. Tsekos
Jiefu Chen,Wolfgang Kainz

A significant number of patients with medical implants like pacemaker leads and orthopedic devices need follow-up MRI scanning during their lifetimes. However, due to radio frequency (RF)-induced heating concerns, MRI scanning for these patients is widely forbidden. Prior research has been done in MRI safety evaluation for the 1.5T coil; however, there has been no investigation of RF-induced heating for the 3T coil with RF shimming. This dissertation proposes a novel Q matrix method to investigate the RF shimming impacts on RF-induced heating around medically implanted leads and orthopedic implants. Using this method, the maximum RF-induced heating under RF shimming conditions can be predicted accurately and efficiently. Medical device implant trajectory, patient body landmarks and human body types contribute to the RF shimming impacts; however, RF shimming conditions impact the RF-induced heating around medical implants significantly.