Bachelor/Software lab project
Evaluation and Improvement of Current-Controlled Mode for Deep Brain Stimulation

Project description:

Parkinson’s disease is characterized by an abnormal neural synchronization in β-band (8-35 Hz) [1]. Suppression of this activity is achieved by deep brain stimulation (DBS), a standard neurosurgical treatment that leads to diminution of the symptoms [2]. However, the mechanism of DBS is not fully comprehended and requires a further investigation in order to increase efficiency of the treatment [3]. Along with experiments in vivo, computational models are being developed that will support the research by predicting sets of promising stimulation parameters and electrode geometries to improve the stimulation success.

Nowadays, current-controlled (c-c) stimulation draws attention due to its higher persistence against electrical double layer effects [4]. The first objective of this project is to evaluate computations on the in-house developed simulation platform for c-c stimulation. Secondly, methods are to be suggested and tested to improve the accuracy and efficiency of the c-c computational models. Lastly, an algorithm for multicontact c-c mode should be developed. Participants will acquire skills in applied programming and computational bioelectromagnetics. Knowledge of FEM, electromagnetic field theory and programming skills are requested.

References: