

Program for the lecture “Modern Applied Mathematics in Bioelectromagnetism, Part I”

Oct.10: **Wolters:** Preliminary discussion, introduction and motivation

Oct.17: **Wolters:** Basics of Electro- (EEG) and Magnetoencephalography (MEG), EEG/MEG source analysis

Oct.24: **Wolters:** Maxwell equations and physical modeling in bioelectromagnetism

Oct.31: **Wolters:** Basic mathematics for bioelectromagnetism (EEG/MEG, TES/TMS): Scriptum chap 6.1.1 – 6.1.4

Nov.7: **Wolters:** Basic mathematics for bioelectromagnetism (EEG/MEG, TES/TMS): Scriptum chap 6.1.5 – 6.1.6

Nov.14: **Wolters:** Finite element method (FEM) based forward modeling for bioelectromagnetism (EEG/MEG, TES/TMS), Part I: Convergence analysis and source models

Nov.21: **Wolters:** FEM-based forward modeling for bioelectromagnetism (EEG/MEG, TES/TMS), Part II: Convergence analysis and source models 6.5.2-6.5.4, 6.5.7, 6.2 (Analytical solutions in simplified geometries), 6.5.8-6.5.10 (Validation of numerical procedures in simplified geometries)

Nov.28: **Wolters:** FEM-based forward modeling for bioelectromagnetism (EEG/MEG, TES/TMS), Part III: FEM source models and accuracies

Dec.5: **Wolters:** Linear complexity and fast iterative solver techniques for FEM-based forward modeling (EEG/MEG, TES/TMS): Scriptum chap 6.5.1, 6.5.5-6.5.6, 7

Dec.12: **Wolters:** Different FEM approaches (Continuous and Discontinuous Galerkin FEM (CG-, DG-FEM), unfitted FEM such as Unfitted DG (UDG) and CutFEM, mixed FEM in tetrahedral and hexahedral meshes

Dec.19: **Wolters:** Further topics in EEG and MEG forward modeling: Complete electrode model (CEM), Integral equation method, boundary element method (BEM), sensitivity analysis and model error

Jan.9: **Kellinghaus:** Basics of epilepsy and EEG

Jan.16: **Bauer:** Introduction to MRI

Jan.23: **Wolters:** Parametric registration of MRI

Jan.30: **Wolters:** Segmentation of MRI

Further links/literature:

This

<http://www.sci.utah.edu/~wolters/LiteraturZurVorlesung/>

is the basic link to our lecture.

Please find

<http://www.sci.utah.edu/~wolters/LiteraturZurVorlesung/Vorlesungen/>

always the newest lecture-notes/slides and the tutorial material.

Please find

<http://www.sci.utah.edu/~wolters/LiteraturZurVorlesung/Vorlesungsskriptum/>

the newest version of the lecture scriptum.

Please find

<http://www.sci.utah.edu/~wolters/LiteraturZurVorlesung/Literatur/>

further interesting literature.