

Wavefield Imaging and Inversion

- **Forward wavefield problems:**

Determine (acoustic, electromagnetic) wavefield in a known configuration
Nano-optics, bio-engineering

- **Inverse wavefield problems:**

Determine medium parameters based on field measurements
Geophysics, biomedical applications

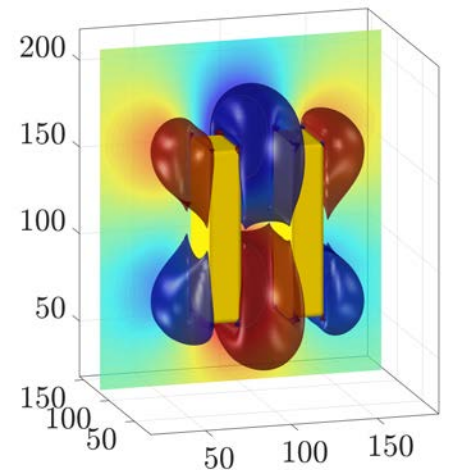
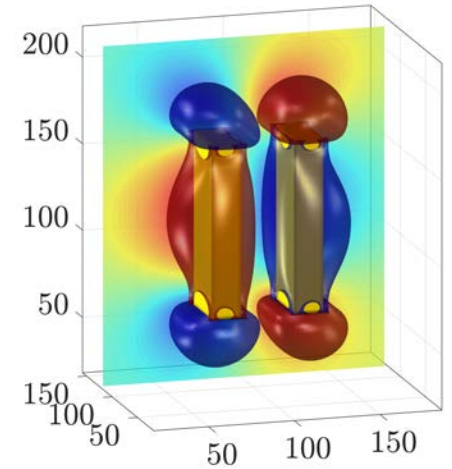
- **Courses:**

Analysis, linear algebra, signals and systems

Advanced electromagnetics

*Wavefield imaging, *advanced MRI

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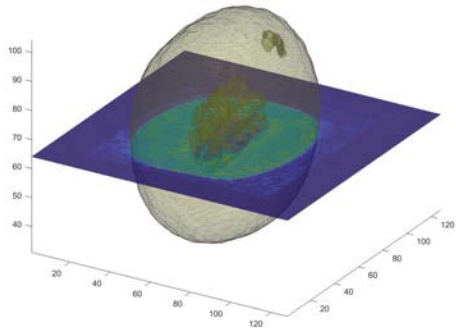
Magnetic Resonance Imaging

- **Contribute to the development of low-field MR scanners**

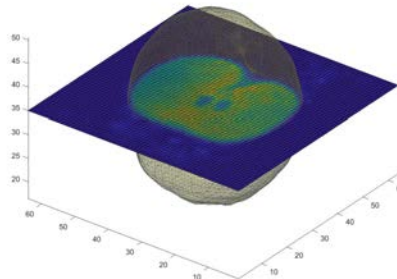
Portable, low-cost, easy to maintain, perfect for rural areas, ...
Background field is produced by permanent magnets!

- Contribute to **magnet design, gradient and radiofrequency coil design**
- Develop **advanced image processing methodologies and algorithms for low-field MRI**

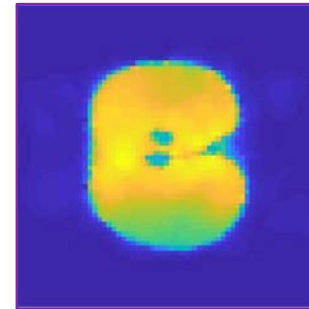
In cooperation with the Leiden University Medical Center



3D reconstruction



3D reconstruction



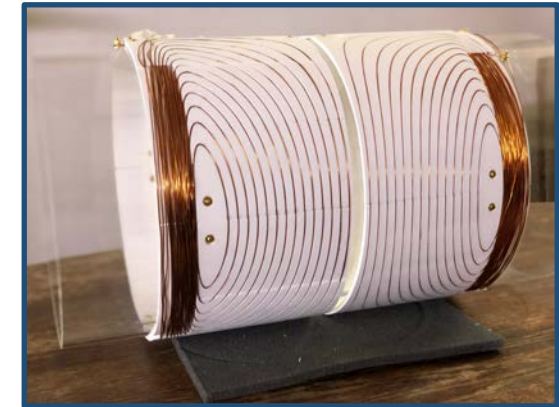
2D slice



Low-field
brain image



Scanner



Gradient coil

Developed by TU Delft MSc student



Low-field
knee image

Magnetic Resonance Imaging

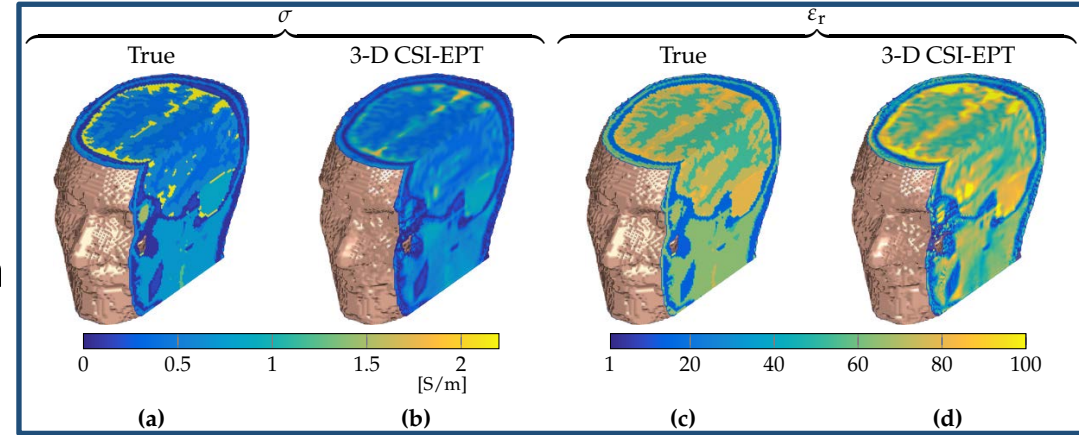
- **Electrical Properties Tomography – EPT**

The dielectric parameters of tissue – the conductivity and permittivity – can serve as important biomarkers. Also important for heat prediction inside the body.

EPT: retrieve the tissue parameters from standard MR data

Contribute to the development of efficient and accurate EPT reconstruction techniques

In cooperation with the University Medical Center Utrecht and the Leiden University Medical Center



True and reconstructed conductivity (left) and permittivity (right) tissue profiles of a male head model

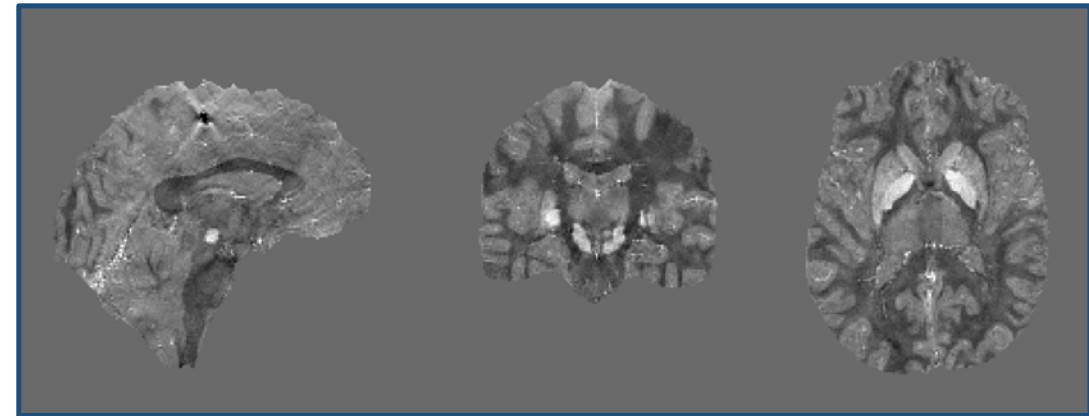
- **Quantitative Susceptibility Mapping – QSM**

The magnetic susceptibility of tissue can be used to characterize e.g. diseased tissue

QSM: retrieve the susceptibility of tissue from field disturbances in the background field of the MR scanner

Contribute to the development of efficient and accurate QSM reconstruction techniques

In cooperation with the F.C. Donders Centre for Cognitive Neuroimaging



Reconstructed susceptibility profiles of the brain using an imaging technique developed at the TU Delft