

MRI Project

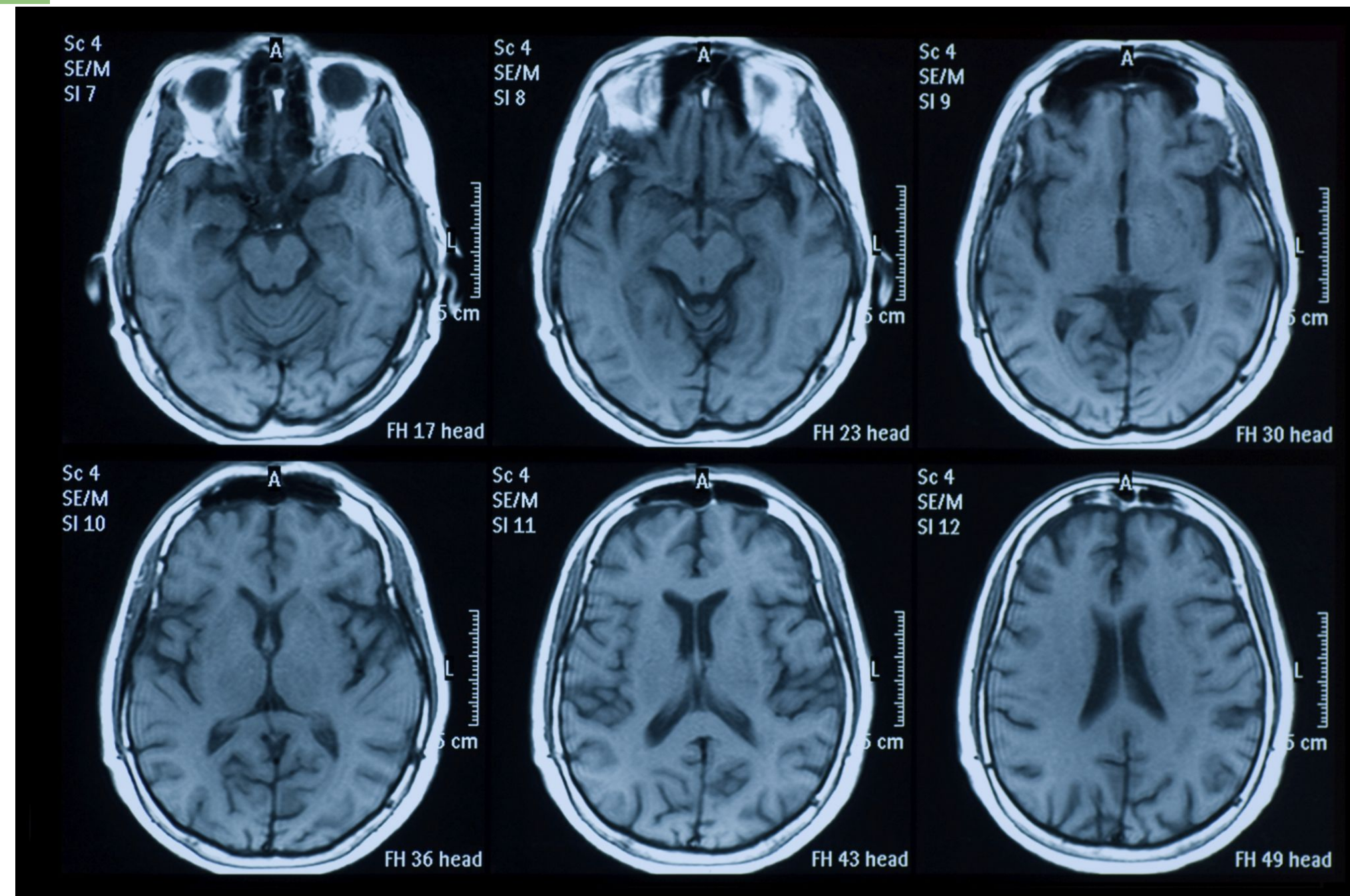
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What is an MRI?

MRI stands for "Magnetic Resonance Imaging"
 MRIs are widely used in the medical field to produce anatomical images.



Novel RF Coil Design:

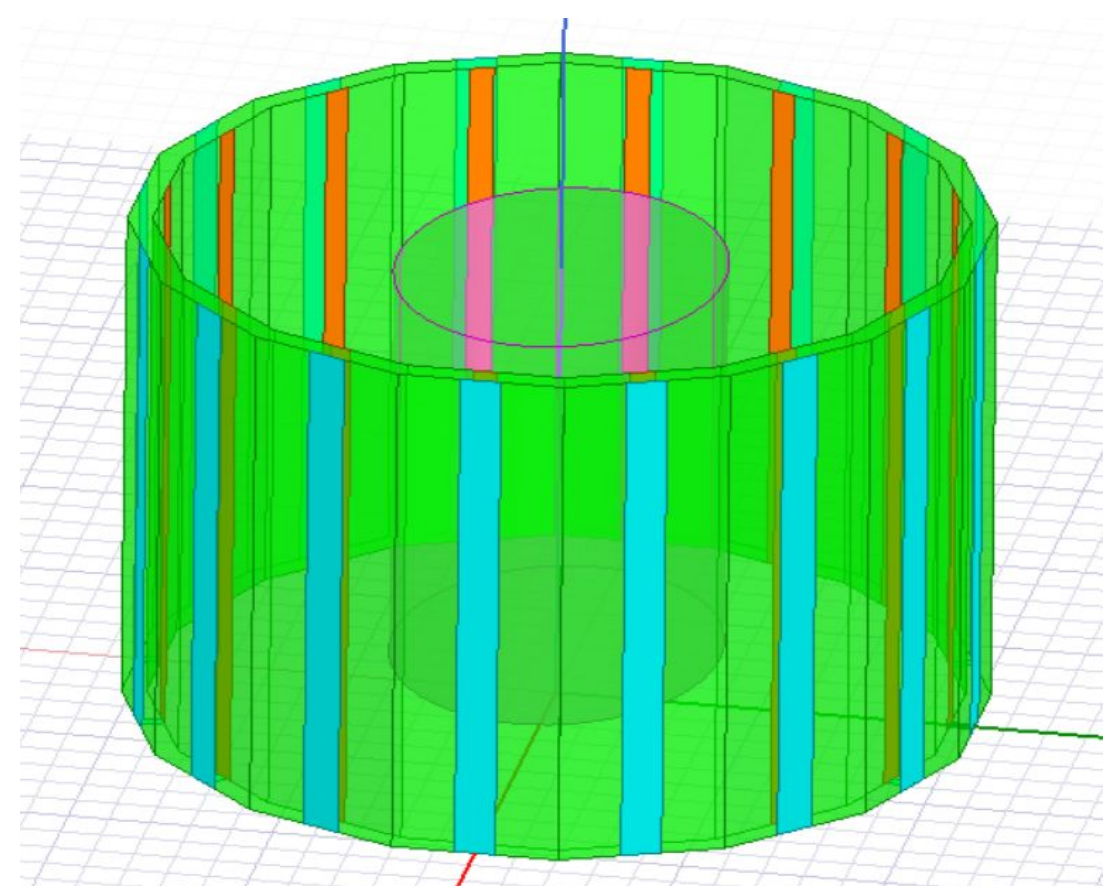
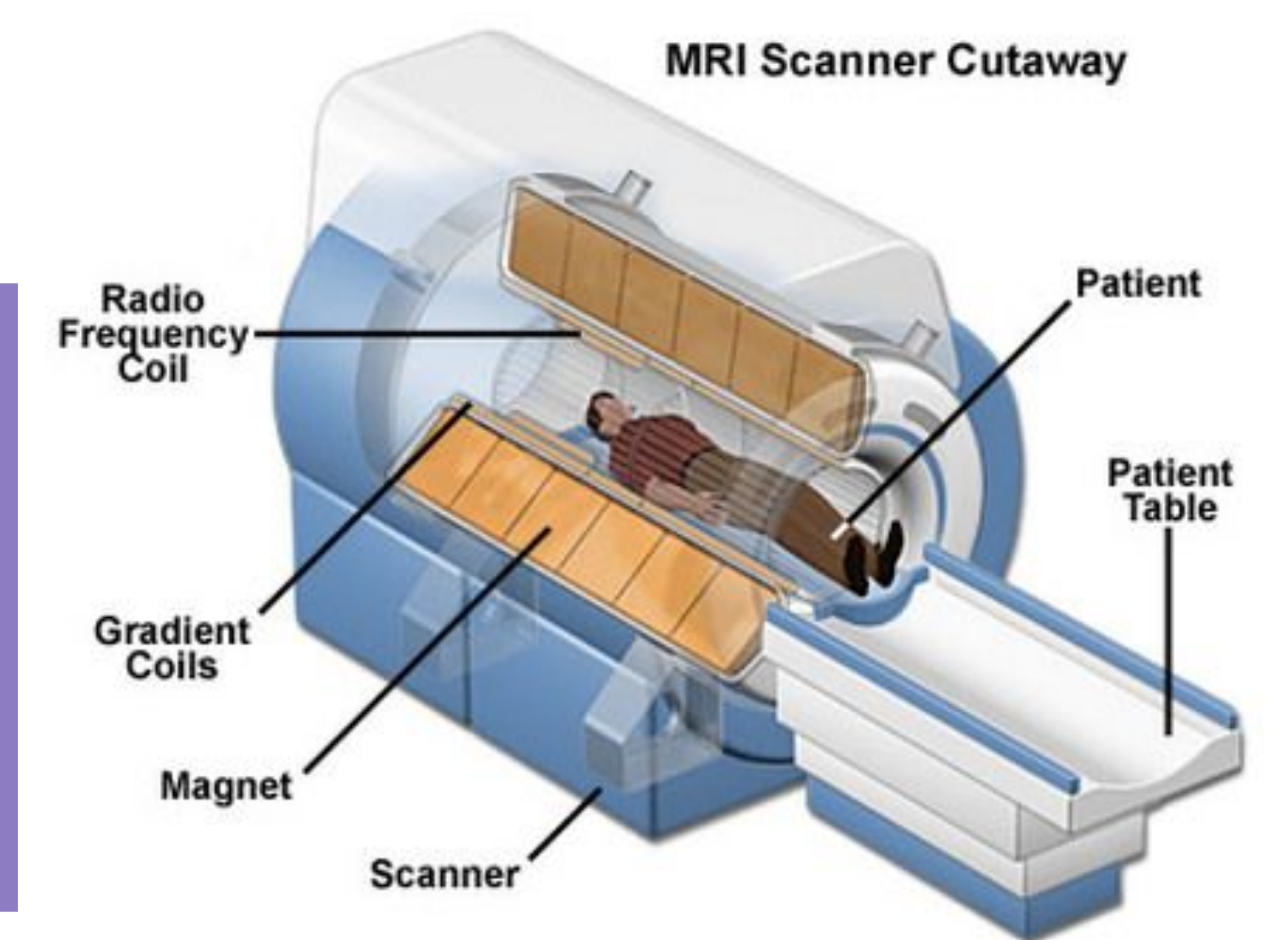
- To design, virtually test, and assemble a new RF coil design to operate at 300 MHz in a 7 T magnetic field
- This design variation should improve several practical characteristics
- Faster imaging process
- Higher imaging resolution

There are several major components of an MRI device

There is a **main magnet**; which is the iconic, very powerful magnet

Gradient coils; coils of wire that predictably distort the magnetic field which is used for spatial encoding of the magnetic resonance (MR) field

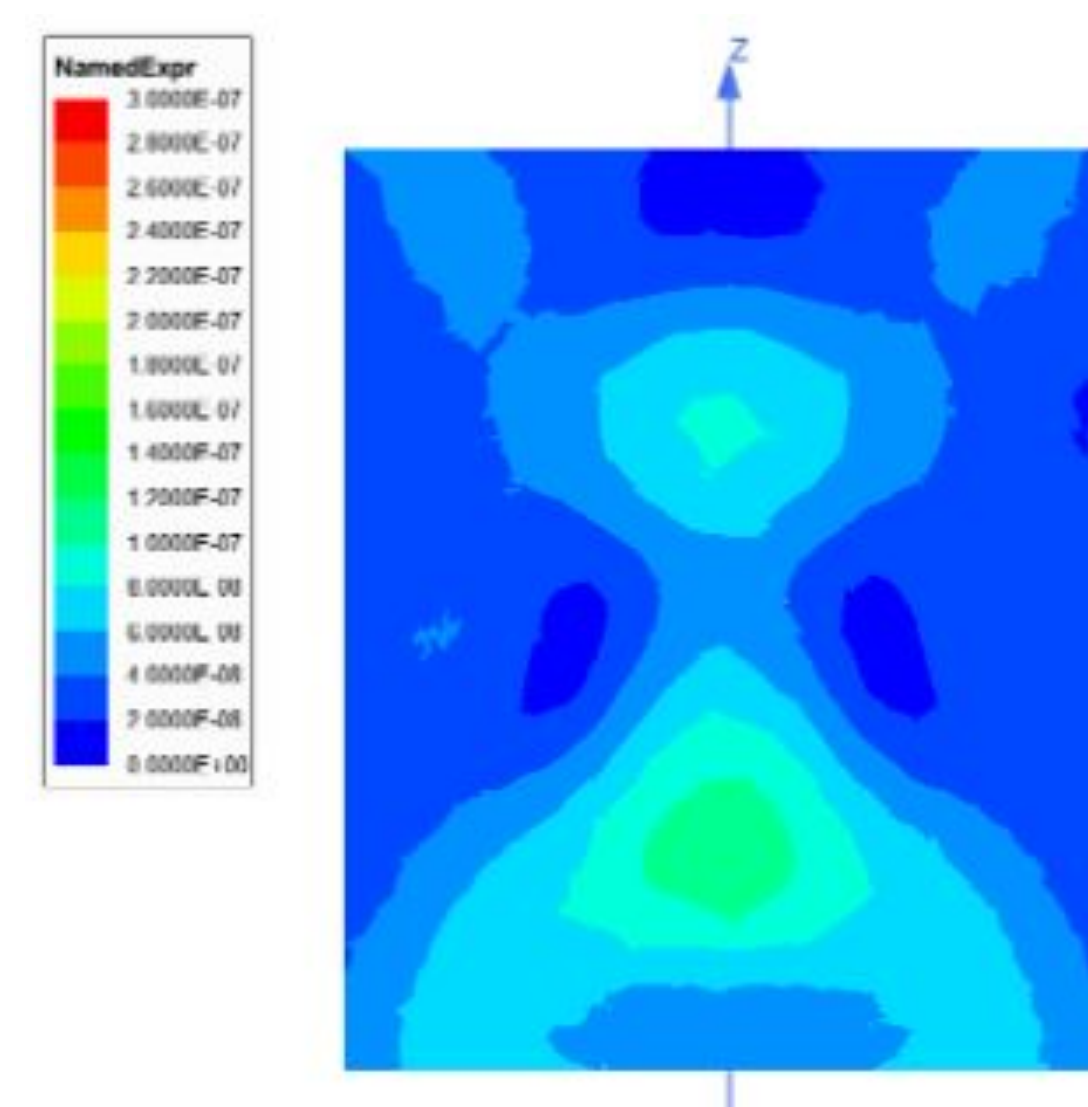
RF coils; coils used to transmit an oscillating magnetic field and receive the returned MR signal



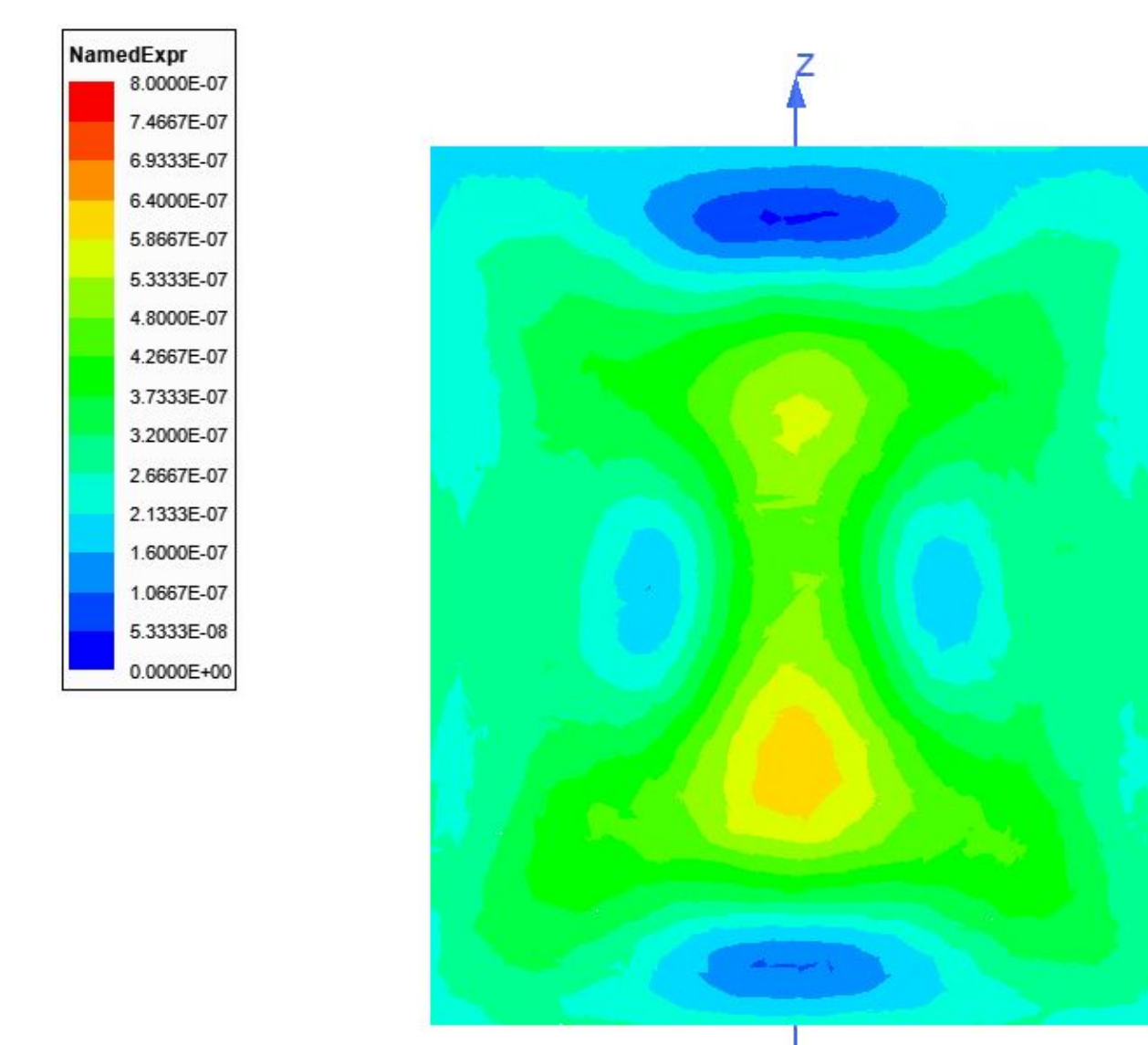
HFSS Model of Industry Standard

- Current industry standard is to use a Microstrip RF Coil in a 3 T magnetic field

Industry Standard Design



Novel Design



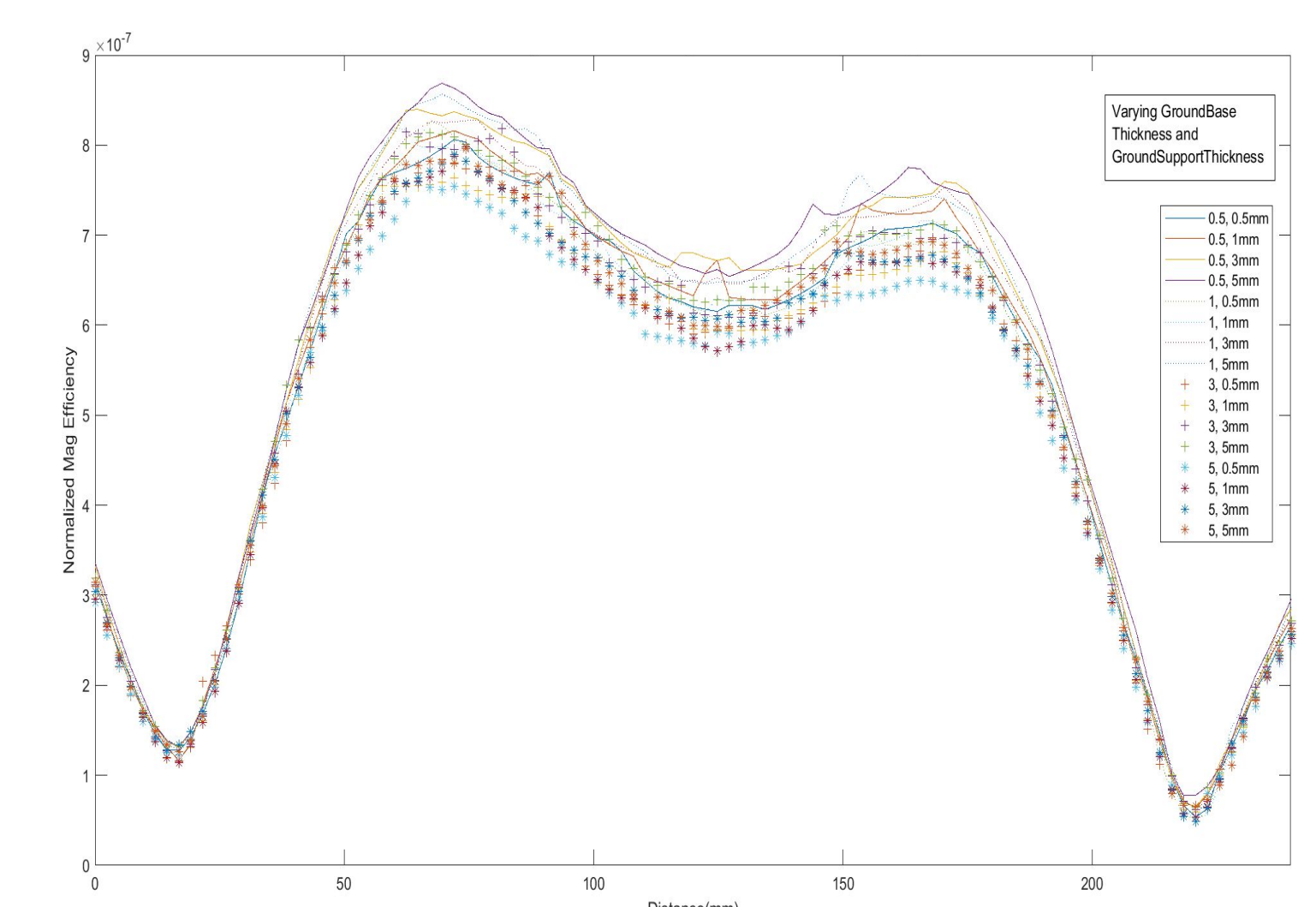
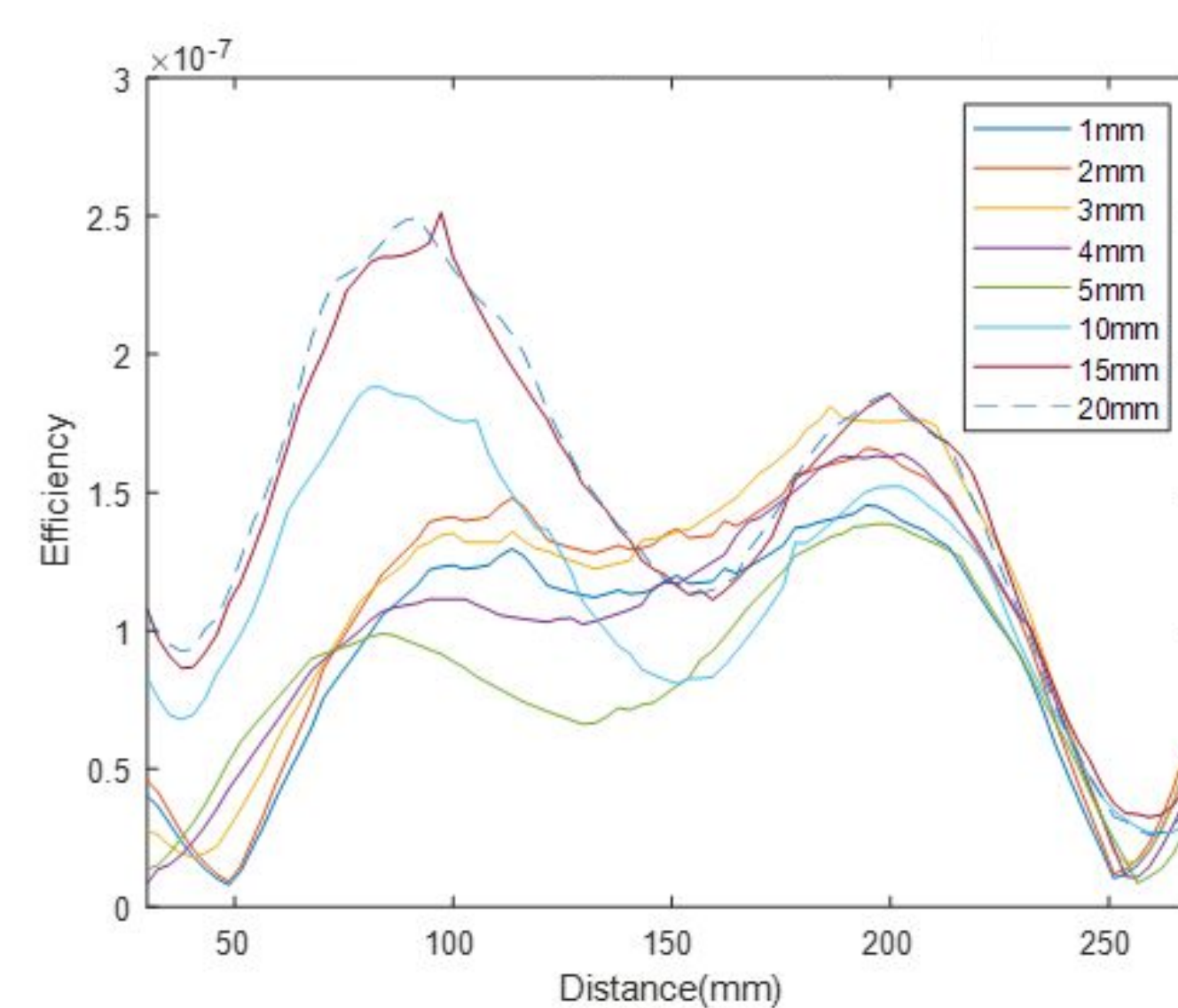
Field Intensity:

These images to the right show a cross section of the long axis of the saline solution material used to demonstrate a living patient. The color gradient indicates the magnetic field intensity inside the material.

Power Efficiency:

We want the parameter to be as high as possible to make maximum use of the input power.

We managed to maintain relatively high power efficiency for the new RF coil design, compared to that of the industry standard.



Coupling:

This is a measurement of how much a signal in one element affects the signal in an adjacent element.

We want the parameter to be as low as possible to minimize the interactions among channels.

