

# ANSYS Forces in Permanent Magnets - Pre-Analysis & Start-Up

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## Pre-Analysis & Start-Up

### Governing Equation

Magnetostatics is the study of magnetic fields in devices where the magnetic field is generated from DC (steady) currents and/or permanent magnets. Magnetostatics is a special case of Maxwell's equations, which form the basis of electromagnetism.

For magnetostatics the electric field inside of a current carrying coil is completely decoupled from the magnetic field, and the following Maxwell's equations are solved for magnetostatics -

$$\nabla \times \mathbf{H} = \mathbf{J}$$

$$\nabla \cdot \mathbf{B} = 0$$

$$\mathbf{B} = \mu_0 \mu_r(\mathbf{H}) \cdot \mathbf{H}$$

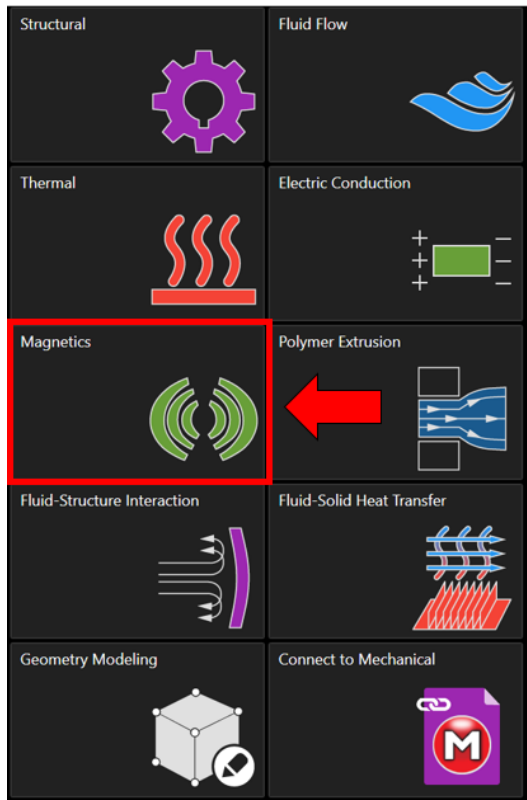
Where  $\nabla$  denotes divergence,  $\mathbf{H}$  is the magnetic field intensity,  $\mathbf{J}$  is the current density, and  $\mathbf{B}$  is the magnetic flux density.

## Start Up

A few words on the formatting on the following instructions:

1. [Notes that require you to perform an action are colored in blue](#)
2. General information will be colored in black, but do not require any action
3. Words that are **bolded** are labels for items found in ANSYS AIM
4. [Most important notes will be colored in red](#)

Now that the pre-calculations are finished, we are ready to begin the simulation in ANSYS AIM. Open ANSYS AIM by going to [Start > All Apps > ANSYS 18.2 > ANSYS AIM 18.2](#). Once starting page has opened, select the **Magnetics** template as shown below.



[Go to Step 2: Geometry](#)

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