ANSYS Forces in Permanent Magnets - Physics Setup

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Problem Specification 1. Pre-Analysis & Start-Up

- Geometry
 Physics Setup
- 4. Case Setup
- 5. Solution/Results

Physics Setup

AIM will automatically create an enclosure around the geometry. In order to see the inside geometry click on Physics > click on the box > right click on the box > Hide Body.



Specify Material

Click on Add, next to Material Assignments > Material Assignment > Copper (Material Samples). Next, click on the body selection tool in top right corner. Select the coil and click Add. This assigns copper to the coil.

Add 🗸		
🖾 Material Assignment	• 🛧 🛛	ir (Material Samples)
Duplicate of	• 🛧 ا	luminum Alloy (Material Samples)
	📩 🔁	Copper (Material Samples)
	ء 🖈	Structural Steel (Material Samples)
	📩 v	Vater (Material Samples)
	۹ 🕑	teel 1010 (Material Samples)
	ممد	ir
	P	Type to search
		dd Library



Then, click on next step and repeat the process. Assign NdFe30 (Material Samples) to the magnet and Brass (Material Samples) to the spool. (You can use "Type to Search" to find NdFe30 and Brass in the material library.)

Boundary Conditions / Forces

Now force computation must be set up. Click Next Step > Fix > Force Computation. Select the magnet using body select and click the +. Leave all other setting in default condition.

Force Computation 1
Up-to-date
Location
Force type Virtual Lorentz
Reference frame Global Reference Frame 👻 Next Step 👻
> Related Objects and Tasks

Since a current is running through the copper coil, a current condition will need to be created. Right click > Add > Electromagnetic Conditions > Current.



Select the surface by looking for the line in the line that runs perpendicular to the spool face. Click on the plane below the line by using the plane selector. Then input a **Current** of .01 amps and 280 for the **Number of Conductors**. Click on the arrow below to parameterize the **Operating Current**.

Current 1		
Up-to-date		
Define path by		
Cross-section		
Source and return		
O Multiple terminals		
Location1		
1 volume 💌 🛨 컱		
Operating current		
0.01 A +P +		
Number of conductors		
280		
Reverse polarity		
Connected in parallel		
Show conduction path		
Generate Conduction Paths Next Step -		
> Related Objects and Tasks		

Then click on Generate Conduction Paths, this will show the solver interpretation of the coil. If the solver's interpretation of the coil is incorrect (current is flowing outside of the coil) insulating boundary conditions must be added to ensure that the current stays within the coil. Since the solvers interpretation of the coil is incorrect (current is also flowing in the brass spool), insulated boundary conditions will be added.







In order to check that insulating condition worked, click on Physics > Electromagnetic Conditions > Current 1 > Generate Conduction Paths.



The solvers' new interpretation of the coil is correct. Case one will now be set up.

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