

ANSYS AIM Eddy Current / Magnetic Frequency Response - Physics Setup

Authors: Joshua Wallace, Steve Scampoli

[Problem Specification](#)

[1. Pre-Analysis & Start-Up](#)

[2. Geometry](#)

[3. Physics Setup](#)

[4. Numerical Solution/Results](#)


Physics Setup

Click on **Physics** in the workflow. In the **Physics** template input a **Frequency** of 200Hz.


The screenshot shows the 'Physics' setup window in ANSYS AIM. At the top, there is a red banner with a warning icon and the text 'Attention required'. Below this, the 'Settings' section is expanded, showing 'Calculation type' set to 'Frequency response', 'Frequency specification' set to 'Single value', and 'Frequency' set to '200 Hz'. The 'Physics Definition' section is also expanded, showing 'Physics Regions (1)', 'Material Assignments', '>Physics Options (3)', '>Electromagnetic Conditions', and '>Interface Conditions', each with an 'Add' button. The 'Physics Solution' section is expanded, showing '>Solver Options (3)' (with a warning icon), '>Monitors (2)', and '>Auxiliary Definitions'. The 'Output' section has a 'Solve Physics' button. At the bottom, a red banner indicates '1 object requires attention'.

Specify Material

Click on **Add**, next to **Material Assignments > Material Assignment > Air (Material Samples)**. Next, click on body selection in top right corner. Select the **Surrounding region** and click **Add**. This assigns air to the surrounding region.



Air Assignment 1


Up-to-date

Location ?
1 volume

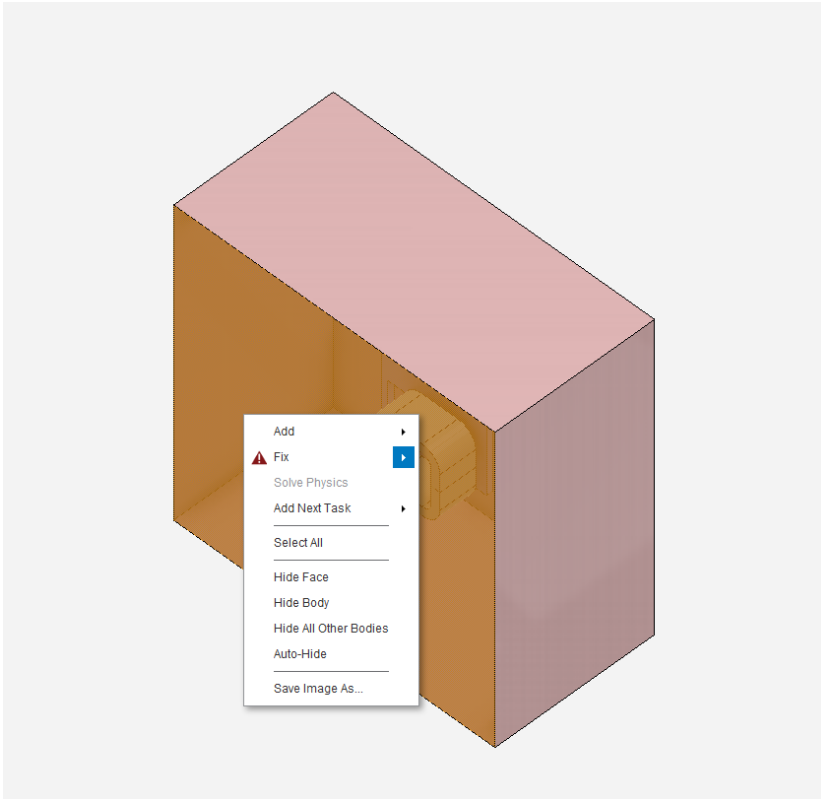
Material
Air

Material state
Gas

>Air (used by 1 object)
Next Step

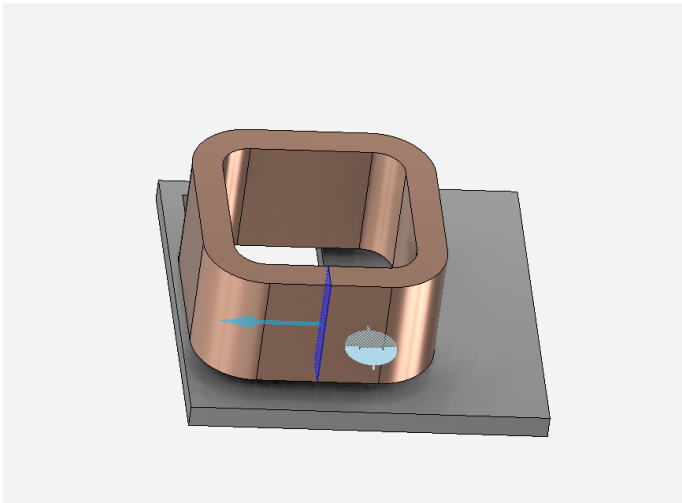
> Related Objects and Tasks

Repeat the above steps except assign **Copper (Material Sample)** to the coil and **Aluminum Alloy (Material Sample)** to the plate. In order to make this process easier. Right click on surrounding region and select **Hide Body**.



Boundary Conditions / Forces

Since a current is running through the copper coil, a current condition will need to be created. Right click > **Add > Electromagnetic Conditions > Current**. Then select the face below for the **Cross-Sectional face or body**.



Input an **Operating Current** of 2.742 Amps and 1000 for **Number of Conductors**.

I

Current 1

Up-to-date

Define path by

☒ Cross-section

☐ Source and return

☐ Multiple terminals

Cross-sectional face or body

1 volume

+

↔

Operating current

2.742 A

▸

Phase

0 radian

▸

Number of conductors

1000

▸

☐ Reverse polarity

☐ Connected in parallel

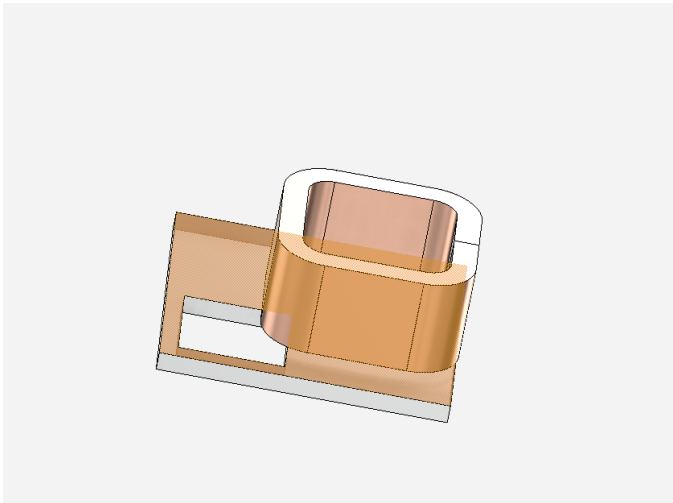
☐ Show conduction path


Generate Conduction Paths

Next Step ▾

> Related Objects and Tasks

Finally, a **Skin Depth Resolution** needs to be specified. Right click, and select **Fix**. Select the top face of the plate and move the **Resolution** slider up to **Fine**. The **Skin Depth Resolution** will automatically refine the mesh where the eddy currents occur.





Skin Depth Resolution 1

Up-to-date

Surface location

1 face ▼ + ↔

Resolution ?

Coarse ————— Fine

Next Step ▼

➤ Related Objects and Tasks

Go to Step 4: Numerical Solution/Results

[Go to all ANSYS AIM Learning Modules](#)