**Objective**

Simulate the magnetic field of a Cyclotron

A blue and grey circular object with a red circle

AI-generated content may be incorrect.

Bottom Half of Cyclotron

A blue and grey structure

AI-generated content may be incorrect.

Cross Section of bottom half

**COMSOL Set-Up**

**1/8 Symmetry**

**Definitions**

A drawing of a building

AI-generated content may be incorrect.

Coil

A blue line drawing of a building

AI-generated content may be incorrect.

Inner Pole

A blueprint of a building

AI-generated content may be incorrect.

Magnet Frame

A blue drawing of a structure

AI-generated content may be incorrect.

Air Domain – Near Field

A blueprint of a building

AI-generated content may be incorrect.

Air Domain – Far field

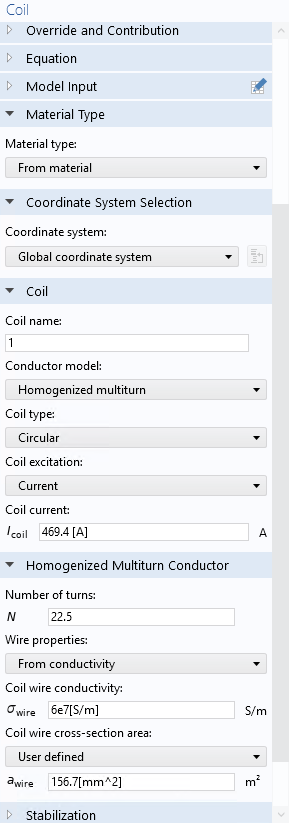
A drawing of a building

AI-generated content may be incorrect.

Infinite element Domain

**Physics**

**Coil**

****

**Magnet Frame & Pole**

**A screenshot of a computer

AI-generated content may be incorrect.**

**Symmetry 1**

**A screenshot of a computer

AI-generated content may be incorrect.**

**Symmetry 2**

**A screenshot of a computer

AI-generated content may be incorrect.**

**Mesh**

**A drawing of a cube

AI-generated content may be incorrect.**

**A screenshot of a computer

AI-generated content may be incorrect.**

Mesh size of each domain was adjusted to remove any warnings

**A screenshot of a computer screen

AI-generated content may be incorrect.**

**Mesh Plot**

**A screenshot of a computer

AI-generated content may be incorrect.**

**Results**

A graph showing a number of numbers

AI-generated content may be incorrect.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Iteration** | **Solution estimate norm** | **Residual norm** | **Damping factor** | **Effective step size** | **residual evaluations** | **#Jac,** | **#Sol,** | **LinIt,** | **LinErr,** | **LinRes,** |
| 1 | 0.028 | 5.10E+03 | 0.1 | 0.031, | 3, | 1, | 4, | 44, | 0.08, | 0.0002, |
| 2 | 0.027 | 4.80E+03 | 0.1 | 0.029, | 5, | 2, | 8, | 89, | 0.035, | -, |
| 3 | 0.026 | 7.10E+03 | 0.1 | 0.028 7 | 3 | 12 | 197 | 0.12 | - |  |
| 4 | 0.025 | 1.10E+04 | 0.1 | 0.028 9 | 4 | 16 | 257 | 0.081 | - |  |
| 5 | 0.024 | 1.00E+04 | 0.0825 | 0.026 11 | 5 | 19 | 285 | 0.1 | - |  |
| 6 | 0.021 | 9.40E+03 | 0.0738 | 0.023 13 | 6 | 22 | 311 | 0.047 | - |  |
| 7 | 0.019 | 8.70E+03 | 0.0738 | 0.021 15 | 7 | 26 | 330 | 0.099 | - |  |
| 8 | 0.016 | 8.10E+03 | 0.0699 | 0.018 17 | 8 | 30 | 349 | 0.058 | - |  |
| 9 | 0.015 | 7.60E+03 | 0.0699 | 0.016 19 | 9 | 34 | 364 | 0.065 | - |  |
| 10 | 0.012 | 7.10E+03 | 0.0620 | 0.014 21 | 10 | 38 | 371 | 0.02 | - |  |
| 11 | 0.011 | 6.60E+03 | 0.0743 | 0.012 23 | 11 | 42 | 377 | 0.012 | - |  |
| 12 | 0.0093 | 6.10E+03 | 0.0856 | 0.01 25 | 12 | 46 | 383 | 0.011 | - |  |
| 13 | 0.0081 | 5.60E+03 | 0.0856 | 0.009 27 | 13 | 50 | 389 | 0.011 | - |  |
| 14 | 0.0061 | 4.40E+03 | 0.2104 | 0.008 29 | 14 | 54 | 395 | 0.026 | - |  |
| 15 | 0.25 | 1.60E+07 | 1 | 0.19 31 | 15 | 57 | 403 | 0.047 | - |  |
| 16 | 0.16 | 6.50E+03 | 0.255 | 0.21 32 | 16 | 59 | 447 | 0.11 | 0.00028 |  |
| 17 | 0.0077 | 7.50E+02 | 1 | 0.08 33 | 17 | 62 | 521 | 0.088 | 0.00022 |  |
| 18 | 0.00073 | 1.10E+02 | 1 | 0.013 35 | 18 | 65 | 665 | 0.11 | - |  |