

AC Magnetic Analysis of a Single-Phase Transformer

Author: EMWorks

Company: EMWorks

- [File Information](#)
- [Model View](#)
- [Materials](#)
- [Load & Restraint Information](#)
- [Coils Information](#)
- [Force and Torque Information](#)
- [Study Properties](#)
- [Results Table](#)
- [Magnetic Flux Density Results](#)
- [Magnetic Field Intensity Results](#)
- [Applied Current Density Results](#)
- [Current Density Results](#)
- [Force Density Results](#)

- [Electric Field Results](#)
 - [Losses Results](#)
 - [Temperature Results](#)
 - [Temperature Gradient Results](#)
 - [Heat Flux Results](#)
 - [Appendix](#)
-

• File Information

Model name: Single_Phase

Model location: C:\Users\imwt\Desktop\Coil Winding\tutorial 1 phase transformer - video\Single_Phase.SLDASM

Results location: C:\Users\imwt\Desktop\Coil Winding\tutorial 1 phase transformer - video

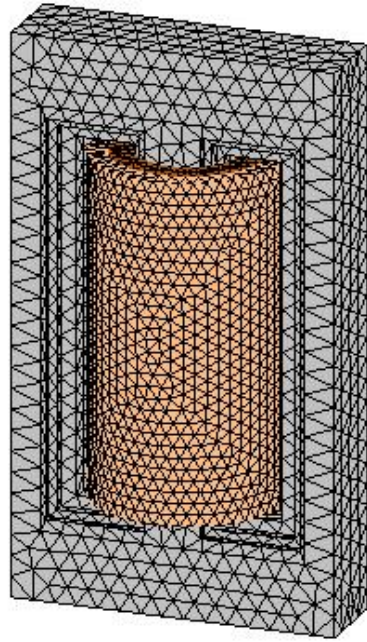
Configuration name: Default

Study type: AC Magnetostatic analysis

Study name: Study 1

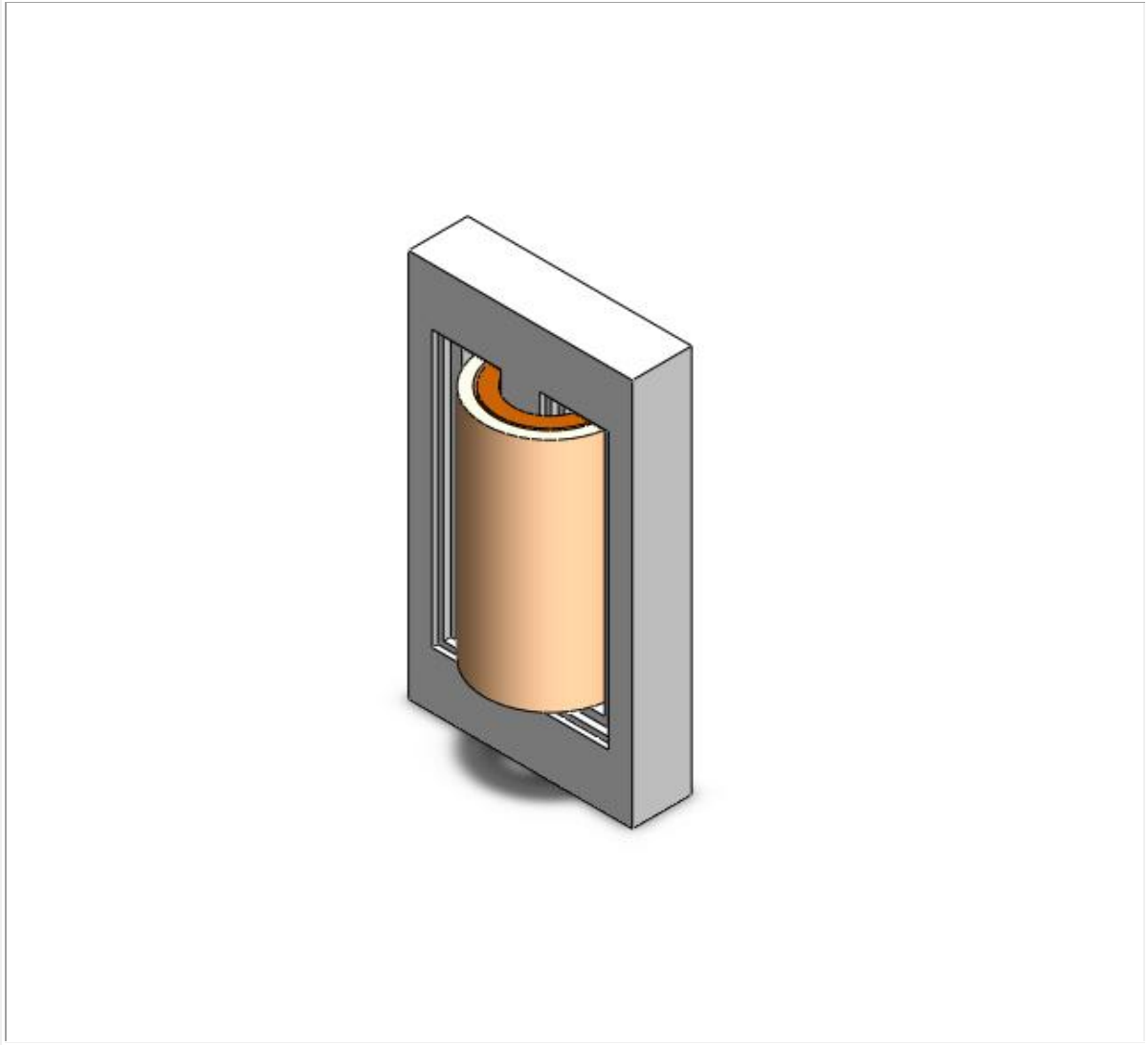
• Model View

Single_Phase_Current View (Mesh)
JPEG



Single_Phase_Isometric View

JPEG



- **Materials**

Note: R.P. stands for Relative Permeability

Nbr	Part Name	Material Name	Permeability Type
1	Coil 1^Single_Phase-1-Body 1 (Split1[1])	Copper	Isotropic
2	Coil 1^Single_Phase-1-Body 2 (Split1[2])	Copper	Isotropic
3	Coil 2^Single_Phase-1-Body 1 (Split2[1])	Copper	Isotropic
4	Coil 2^Single_Phase-1-Body 2 (Split2[2])	Copper	Isotropic
5	Coils_Air^Single_Phase-1-Body 1	Air	Isotropic

	(Cavity1)		
6	Core^Single_Phase-1-Body 1 (Cut-Extrude1)	M36 @ 0.47 mm (60Hz)	Isotropic
7	Inner__Air^Single_Phase-1-Body 1 (Cavity4)	Air	Isotropic
8	Outer_Air^Single_Phase-1-Body 1 (Cavity1)	Air	Isotropic

• Load & Restraint Information

Nbr.	Name	Selected Faces	Selected Components
------	------	----------------	---------------------

Thermal Loads

Nbr.	Name	Convection Coefficient (W/(m ² .K))	Ambient Temperature (Kelvin)	Selected Faces	Selected Components
1	Convection - 1	1.000e+001	3.000e+002	0	Inner__Air^Single_Phase-1 Coils_Air^Single_Phase-1 Outer_Air^Single_Phase-1

• Coils Information

Coils

Nbr .	Name	Nbr.Of Turns	Magnitude	Phase	Components & Bodies
1	Wound Coil - 1	300	5.000000e-001	0.0000e+000deg	Coil 1^Single_Phase-1
2	Wound Coil - 2	600	1.000000e-001	0.0000e+000deg	Coil 2^Single_Phase-1

- **Force and Torque Information**

- **Study Properties**

Mesh Information

Nbr.Of Nodes	Nbr.Of Elements	Element Size (m)	Tolerance (m)
30897	179336	0.228600	0.002286

Solver information

Frequency (Hz)	Compute Circuit Parameters
6.000000e+001	Yes

- **Results Table**

Inductance Results (H)

Coil Name	Wound Coil - 1	Wound Coil - 2
------------------	-----------------------	-----------------------

Wound Coil - 1	1.113994e+000	2.192562e+000
Wound Coil - 2	2.192562e+000	4.546662e+000

Flux Linkage Results

Coil Name	Flux Linkage (Wb)
Wound Coil - 1	0.000000e+000
Wound Coil - 2	0.000000e+000

Current Results

Coil Name	Current (A)
Wound Coil - 1	(5.000000e-001 , 0.000000e+000)
Wound Coil - 2	(1.000000e-001 , 0.000000e+000)

Impedance Results (Ohms)

Coil Name	Wound Coil - 1	Wound Coil - 2
Wound Coil - 1	(1.012830e+001 , 4.199658e+002)	(0.000000e+000 , 8.265766e+002)
Wound Coil - 2	(0.000000e+000 , 8.265766e+002)	(2.765965e+001 , 1.714051e+003)

Coupling Coefficient Results

Coil Name	Wound Coil - 1	Wound Coil - 2
Wound Coil - 1	1.000000e+000	9.742362e-001
Wound Coil - 2	9.742362e-001	1.000000e+000

Leakage Inductance Results

Coil Name	Leakage Inductance (H)
Wound Coil - 1	2.870069e-002
Wound Coil - 2	1.171392e-001

Voltage Results

Coil Name	Voltage (V)
Wound Coil - 1	(5.063971e+000 , 2.926258e+002)
Wound Coil - 2	(2.765734e+000 , 3.780303e+002)

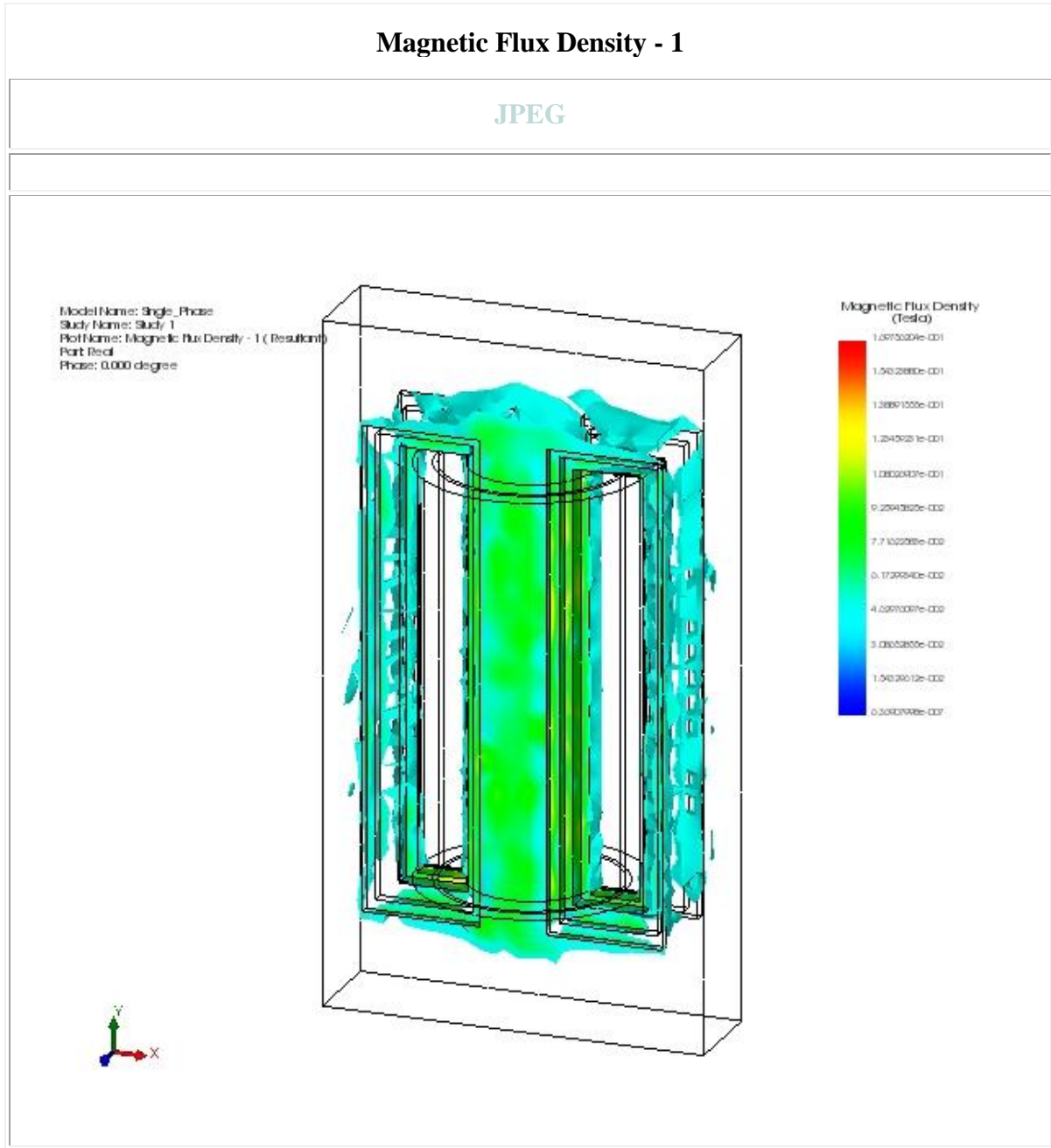
Losses Density Results

Solid Bodies	Ohmic Loss (W)	Eddy Loss (W)	Hysteresis Loss (W)	Excess Loss (W)	Core Loss (W)
Coil 1^Single_Phase-1 - Body 2 (Split1[2])	3.310032e-003	0.000000e+000	0.000000e+000	0.000000e+000	0.000000e+000
Coil 1^Single_Phase-1 - Body 1 (Split1[1])	3.308552e-003	0.000000e+000	0.000000e+000	0.000000e+000	0.000000e+000
Coil 2^Single_Phase-1 - Body 2 (Split2[2])	9.972418e-004	0.000000e+000	0.000000e+000	0.000000e+000	0.000000e+000
Coil 2^Single_Phase-1 - Body 1 (Split2[1])	9.984019e-004	0.000000e+000	0.000000e+000	0.000000e+000	0.000000e+000
Core^Single_Phase-1 - Body 1 (Cut-Extrude1)	7.794321e-001	4.925997e+004	0.000000e+000	1.062163e+001	4.927059e+004

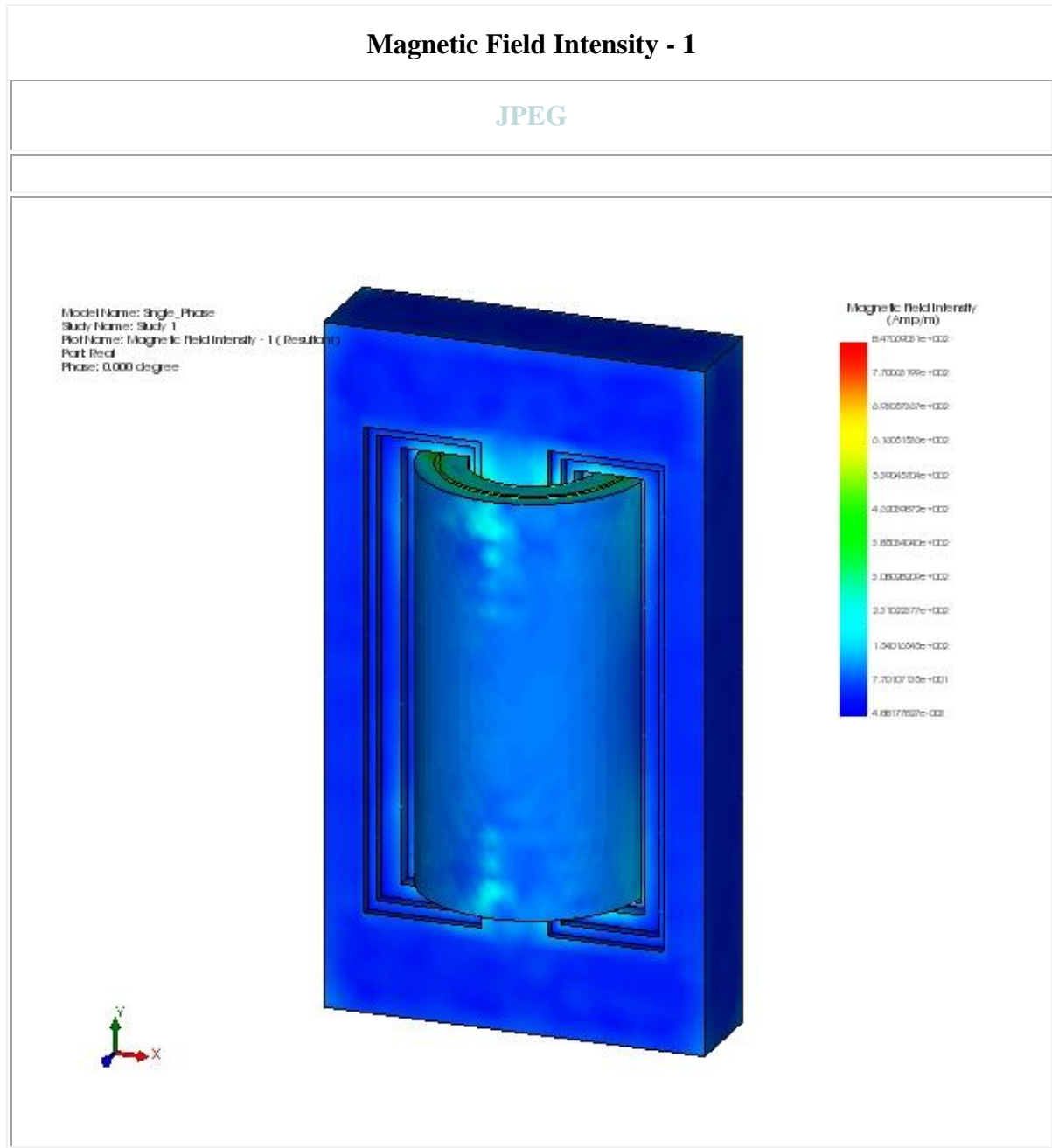
Energy Results

Energy (J)	Co-Energy (J)
2.716107e-001	0.000000e+000

- Magnetic Flux Density Results**



- **Magnetic Field Intensity Results**

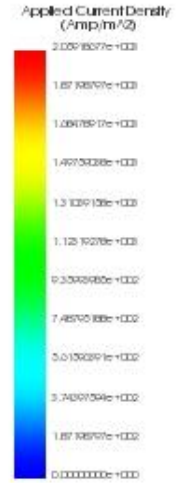
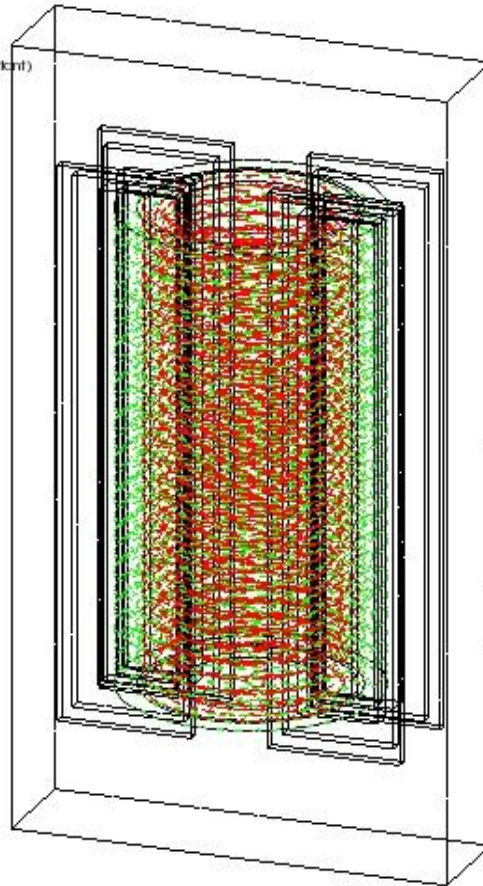


- **Applied Current Density Results**

Applied Current Density - 1

JPEG

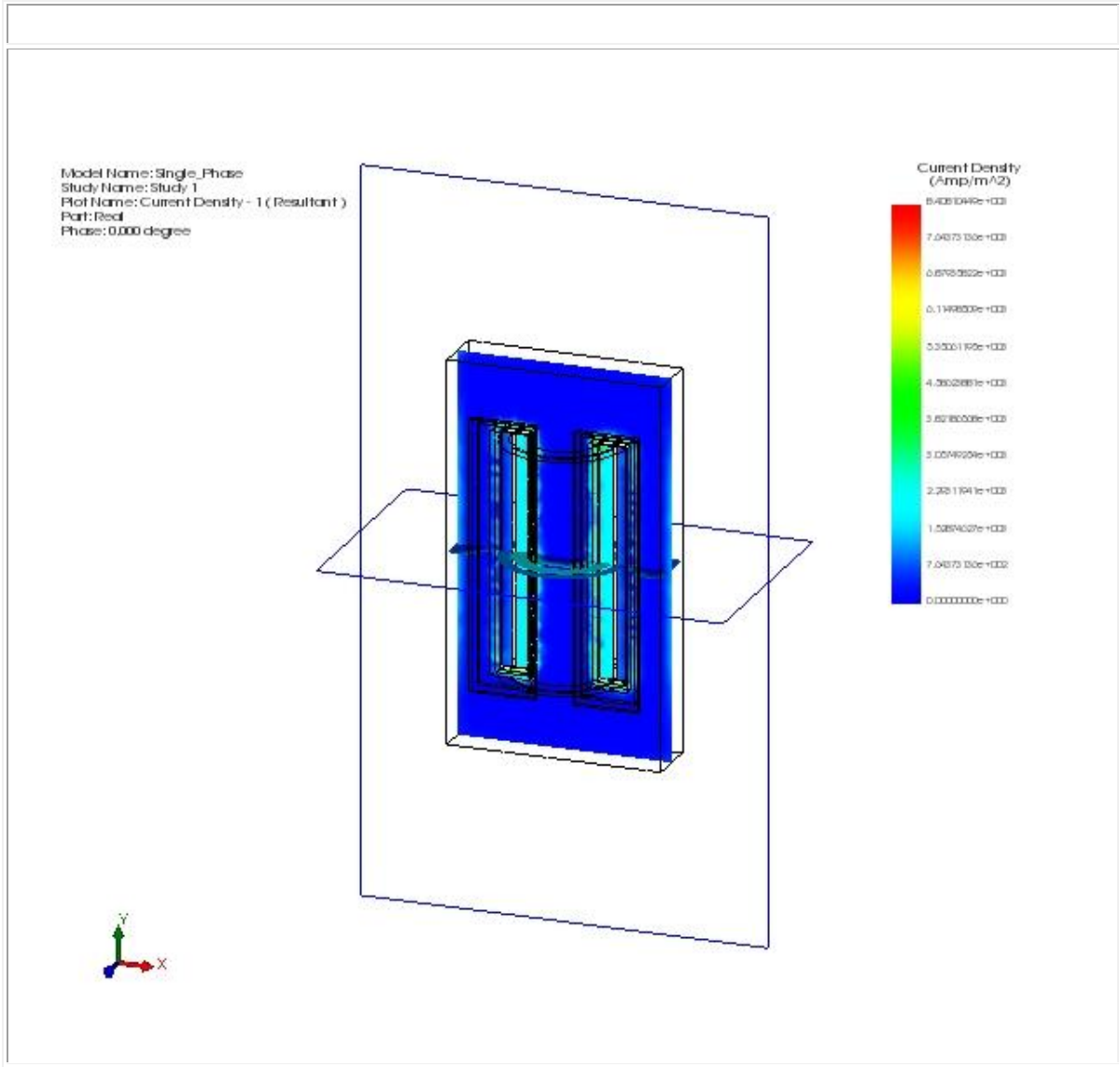
Model Name: Single_Phase
Study Name: Study 1
Plot Name: Applied Current Density - 1 (Resultant)
Part: Red1
Phase: 0.000 degree



- **Current Density Results**

Current Density - 1

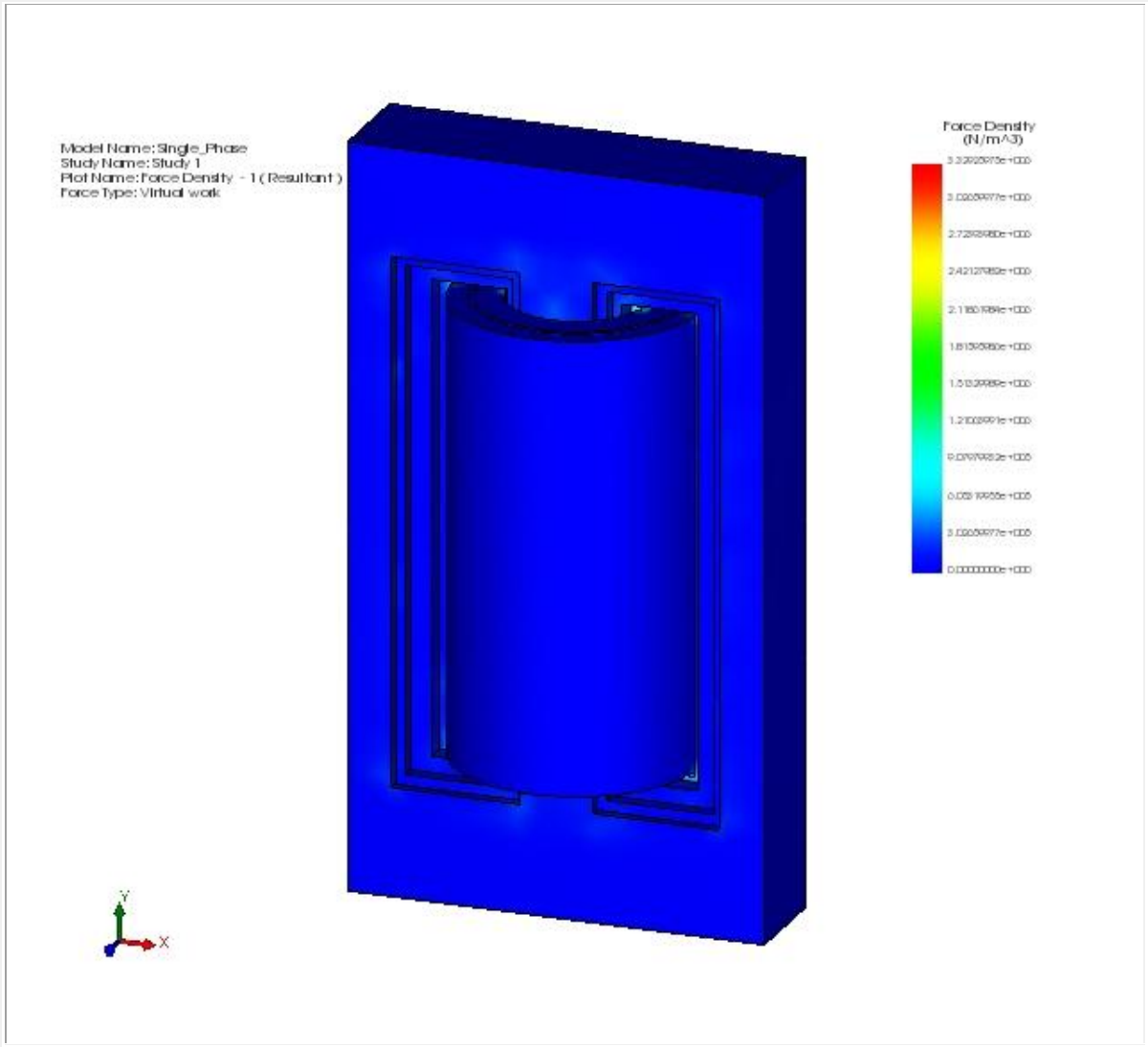
JPEG



- **Force Density Results**

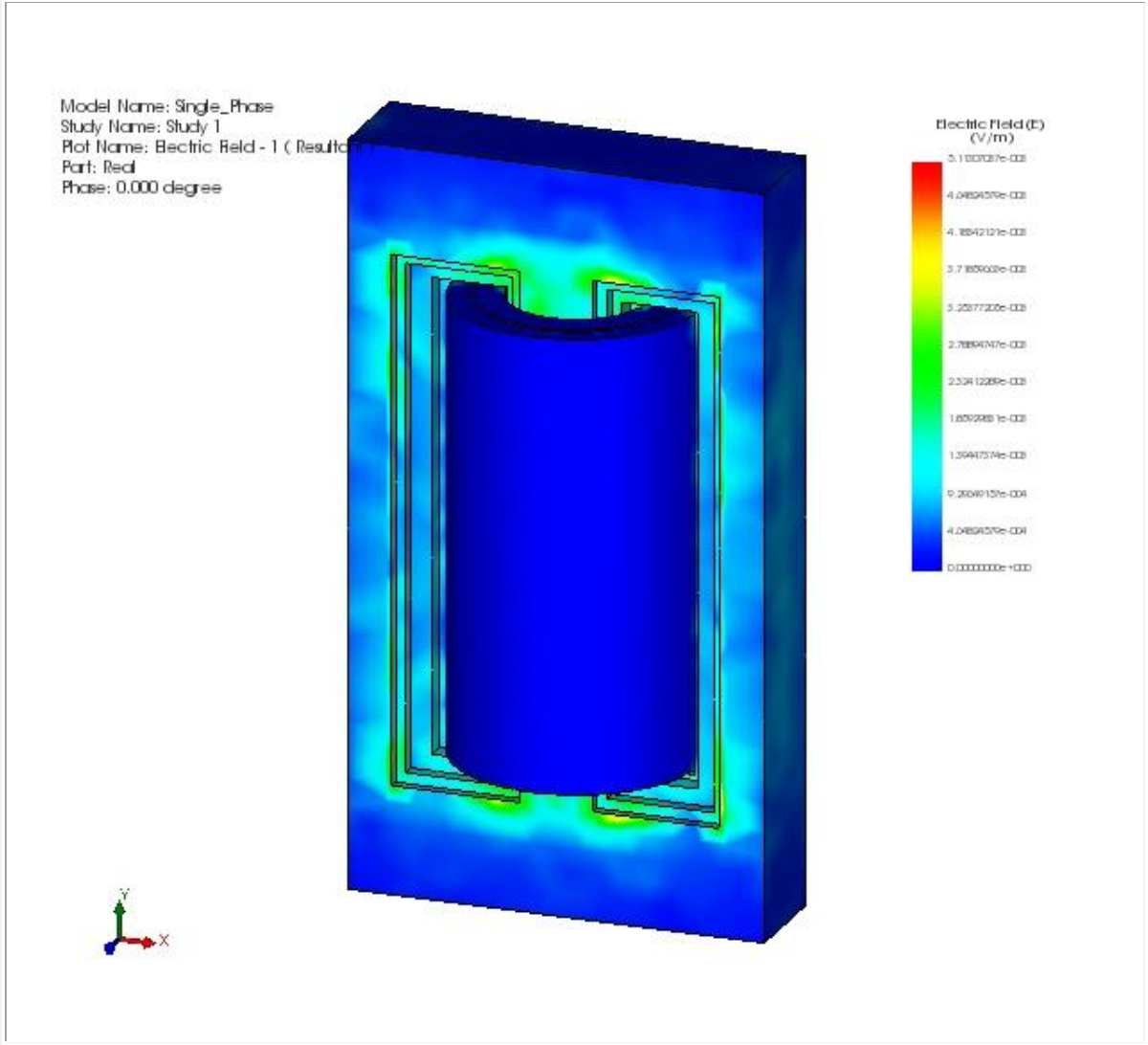
Force Density - 1

JPEG



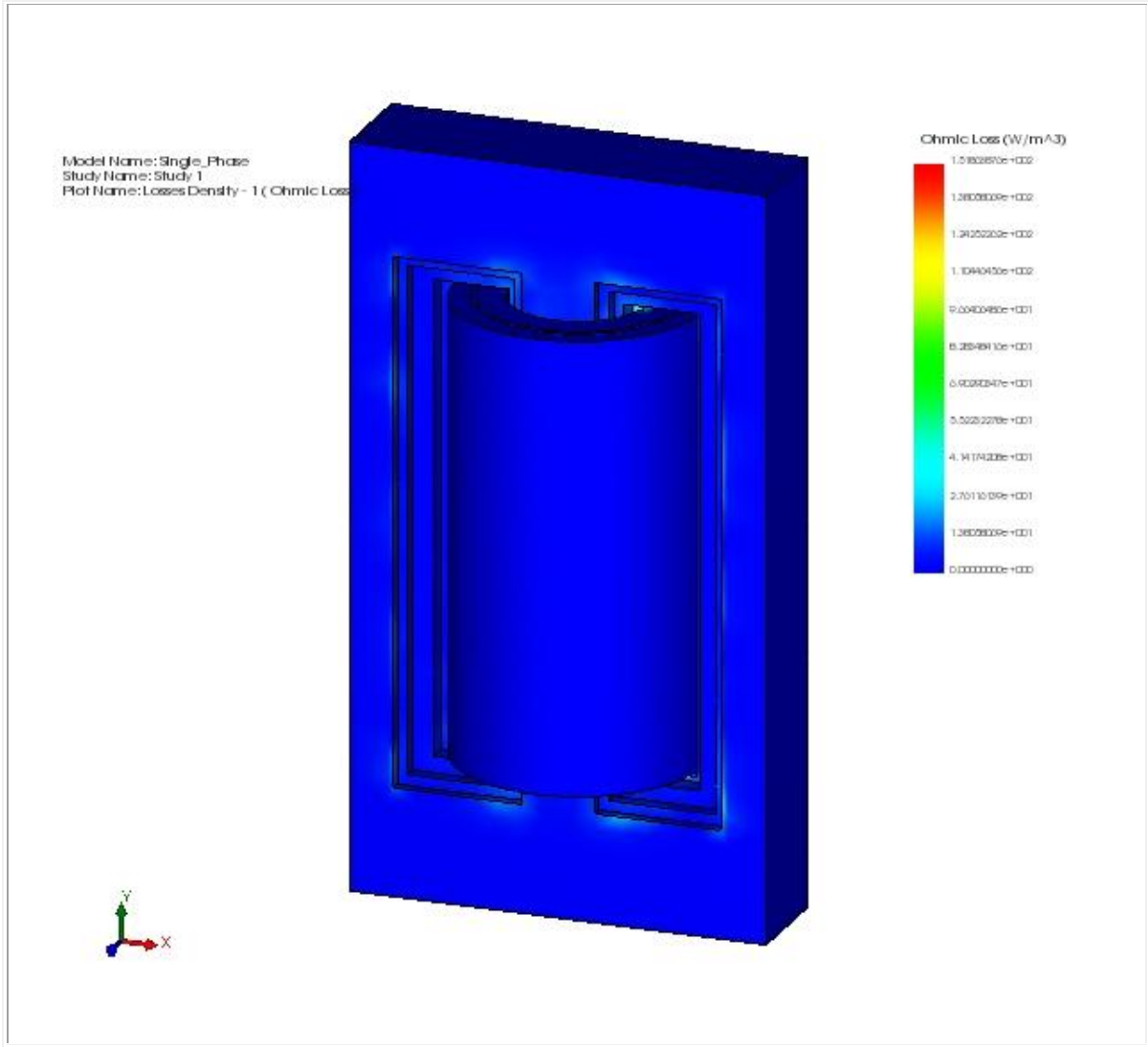
- **Electric Field Results**

Electric Field - 1
JPEG



- **Losses Results**

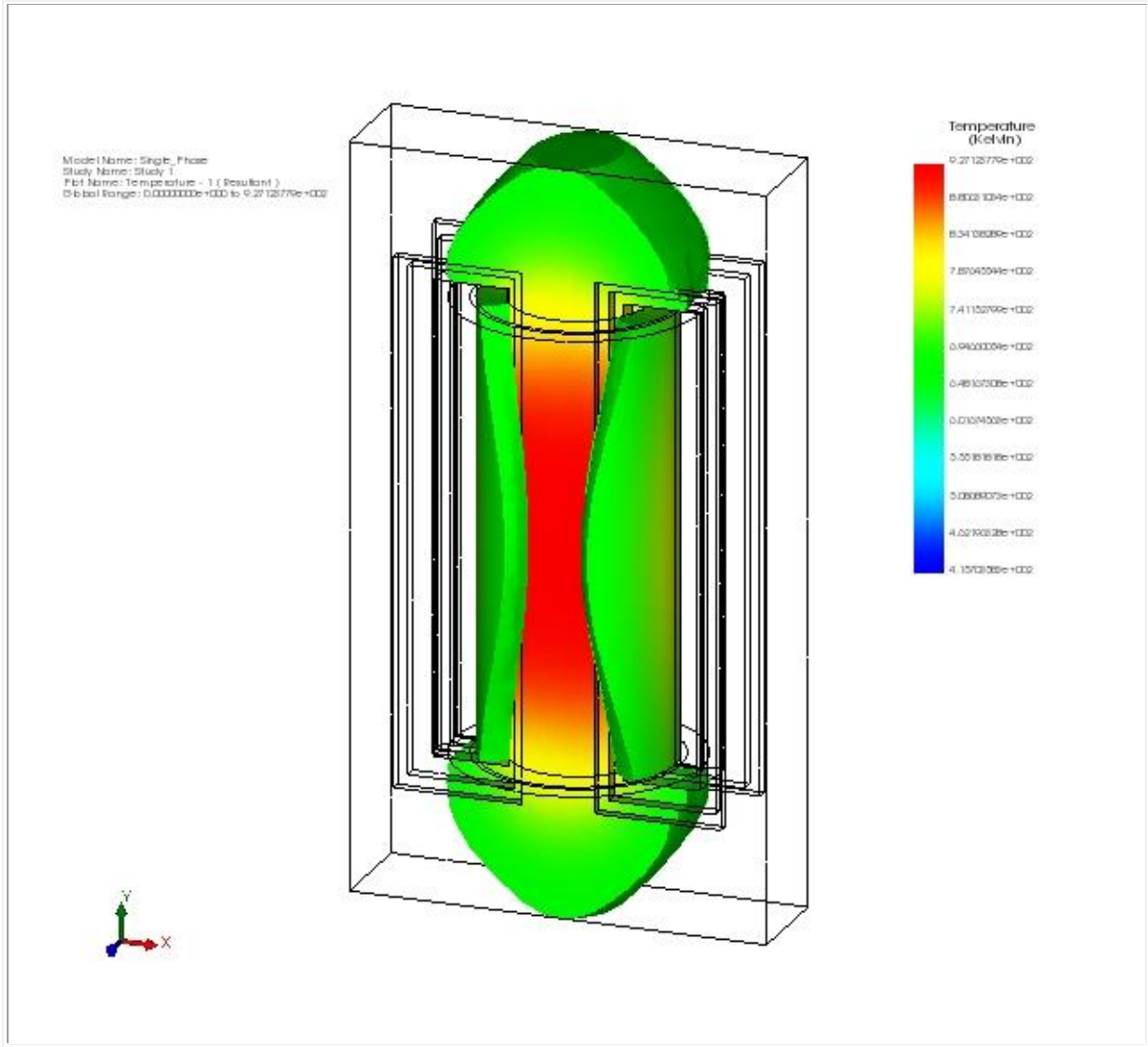
Losses Density - 1
JPEG



- **Temperature Results**

Temperature - 1

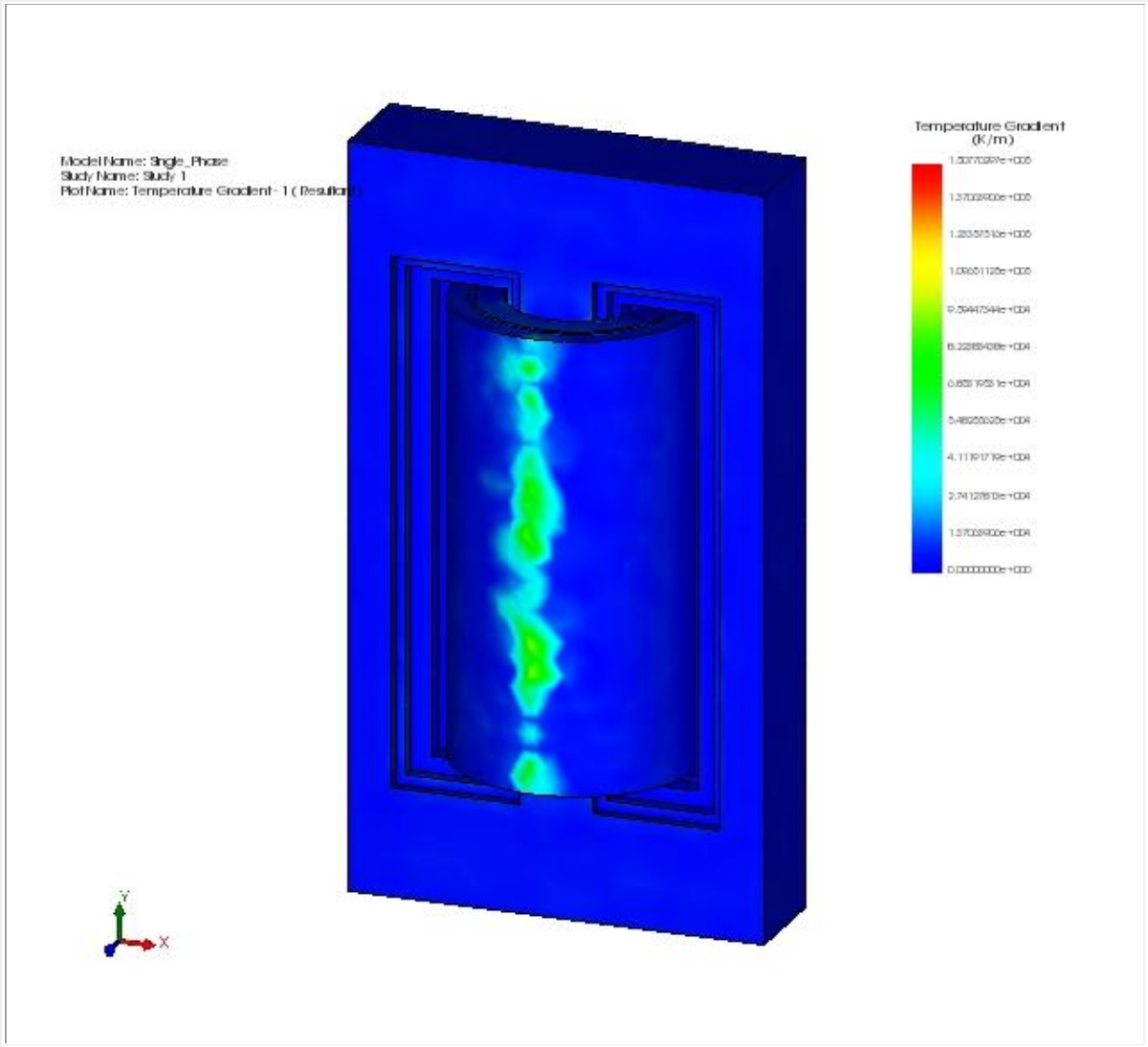
JPEG



- **Temperature Gradient Results**

Temperature Gradient - 1

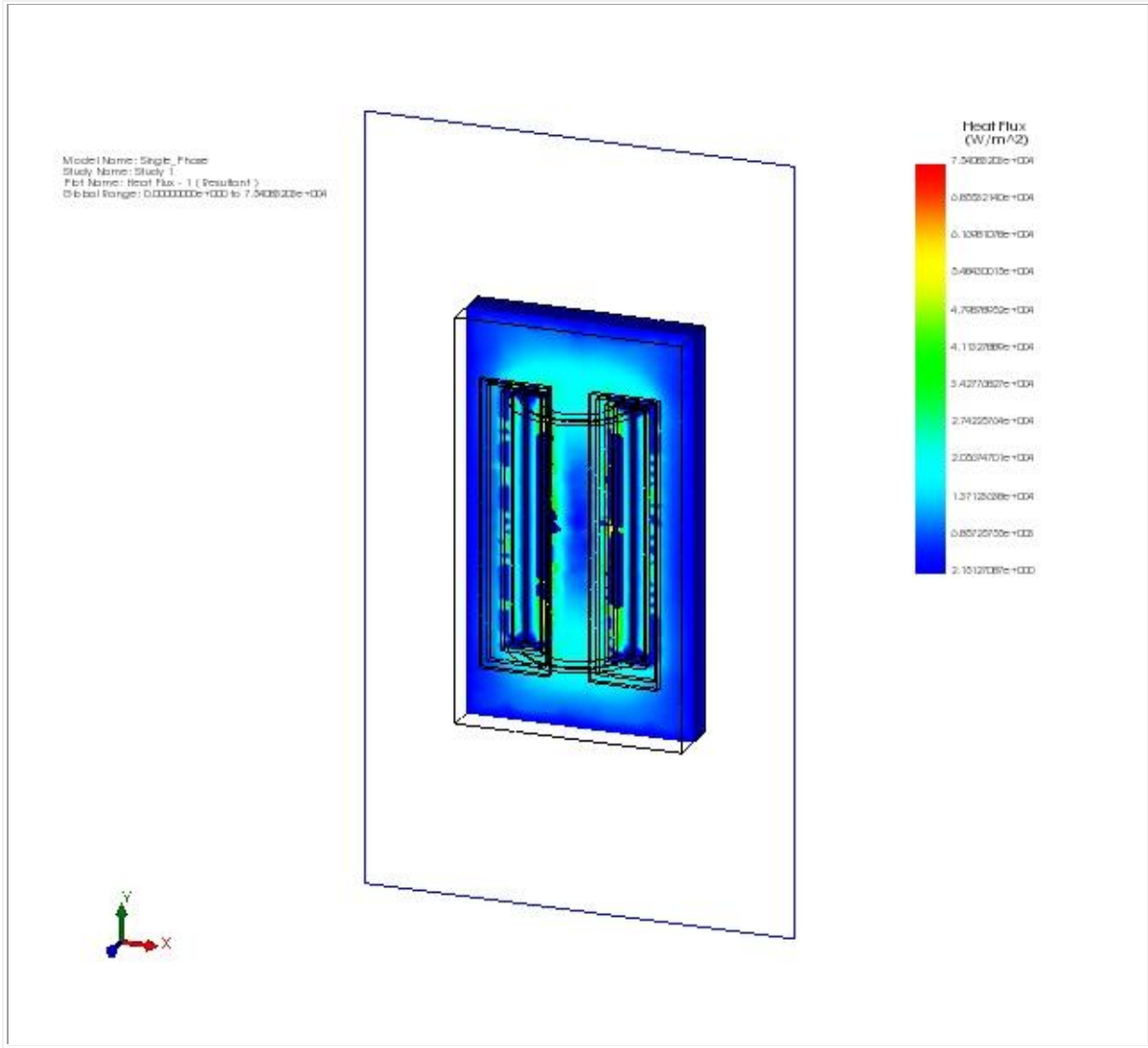
JPEG



- **Heat Flux Results**

Heat Flux - 1

JPEG



- **Appendix**

Material Name: Copper

Permeability Type: Isotropic

Note: R.P. stands for Relative Permeability

R.P.	Conductivity(Mho/m)	Permanent Magnet	Thermal Conductivity (W/m.K)
------	---------------------	------------------	---------------------------------

0.000e+000	5.700e+007	No	4.000e+001
------------	------------	----	------------

Material Name: Air

Permeability Type: Isotropic

Note: R.P. stands for Relative Permeability

R.P.	Conductivity(Mho/m)	Permanent Magnet	Thermal Conductivity (W/m.K)
0.000e+000	0.000e+000	No	2.400e-002

Material Name: M36 @ 0.47 mm (60Hz)

Permeability Type: Isotropic

Note: R.P. stands for Relative Permeability

R.P.	Conductivity(Mho/m)	Permanent Magnet	Thermal Conductivity (W/m.K)
0.000e+000	2.326e+006	No	4.300e+001