Synchronous Generator

Contents

Global Definitions

Date	Apr 26, 2019 12:22:21 PM

GLOBAL SETTINGS

Name	Synchronous Generator.mph
Path	C:\Users\Scrupy\Desktop\Github_Projects\Synchronous Generator.mph
Version	COMSOL Multiphysics 5.4 (Build: 295)

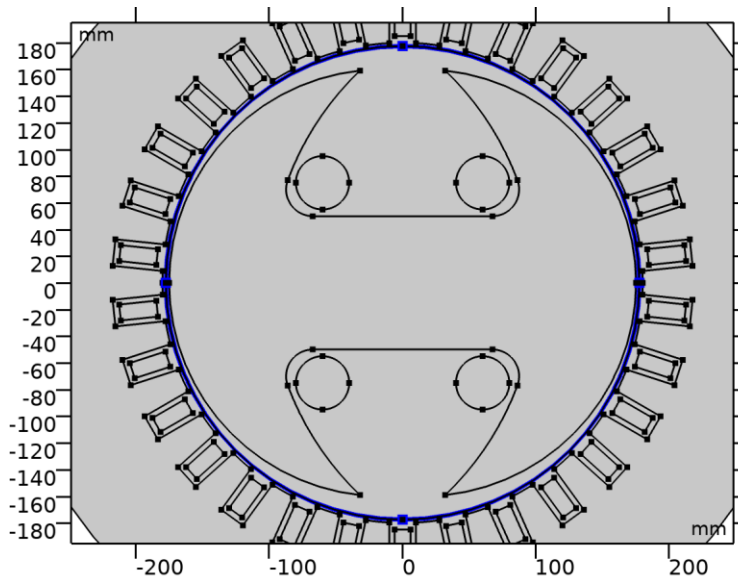## USED PRODUCTS

COMSOL Multiphysics
AC/DC Module

Synchronous Generator

DEFINITIONS

Pairs

Identity Boundary Pair 1

Pair type	Identity pair
Pair name	ap1

Source selection
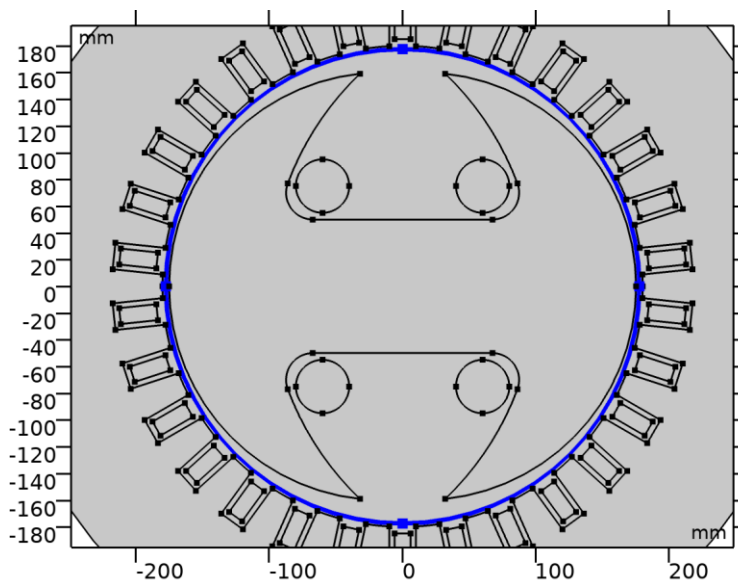
Destination selection

Coordinate Systems

Boundary System 1

Coordinate system type	Boundary system
Tag	sys1

COORDINATE NAMES

First	Second	Third
t1	n	to

Moving Mesh

Rotating Domain 1

Tag	rot1

Geometric entity level	Domain
Selection	Domains 33–38
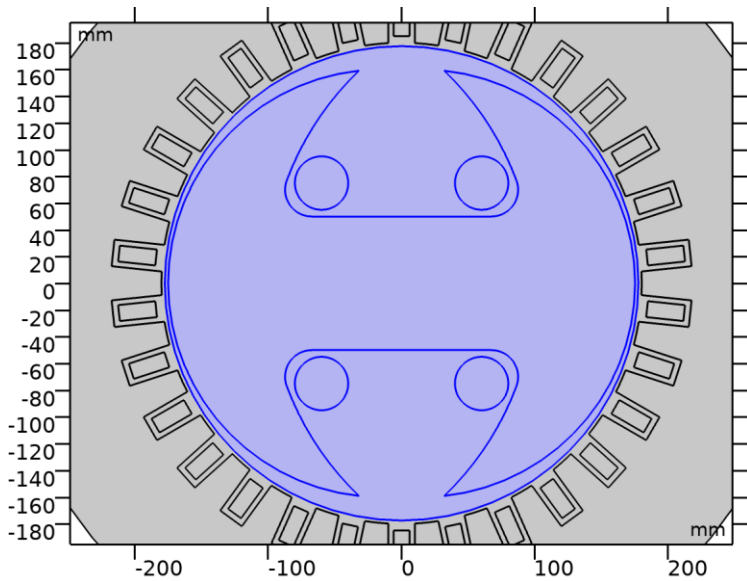
Selection

GEOMETRY 1
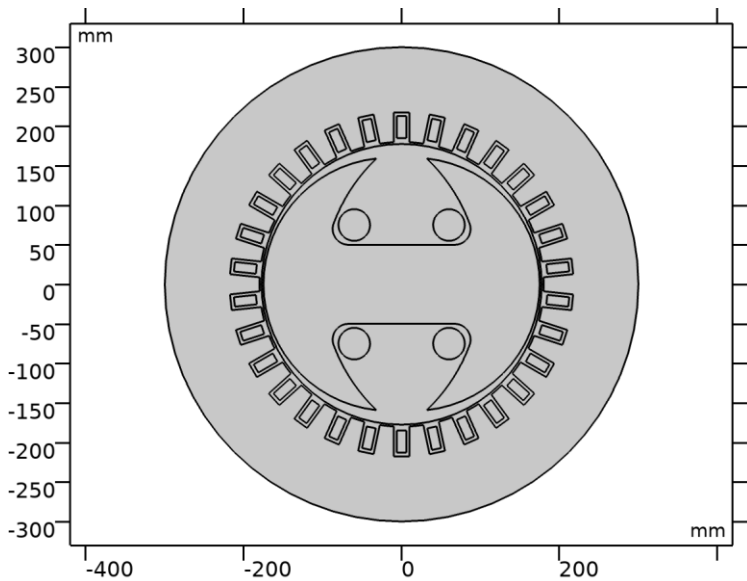
Geometry 1

Length unit	mm
Angular unit	deg

MATERIALS

Air

Air
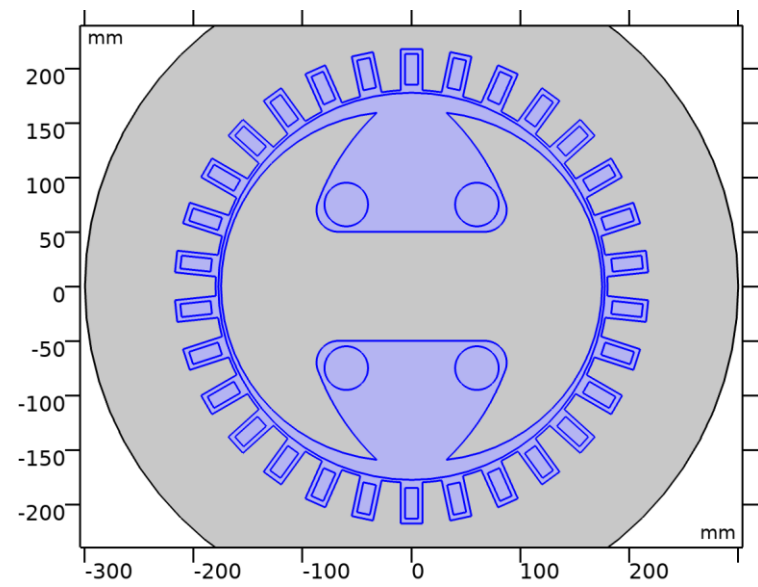
Geometric entity level	Domain
Selection	Domains 1, 3–33, 35–38

Material 2
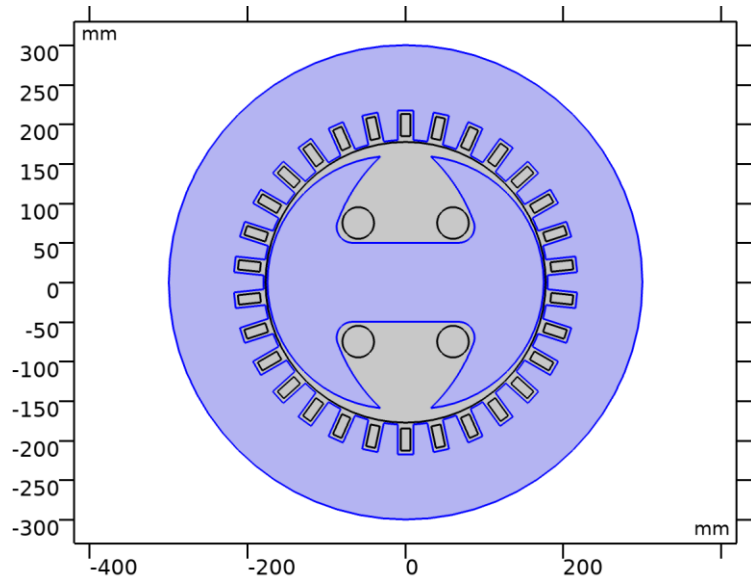
Material 2

ROTATING MACHINERY, MAGNETIC
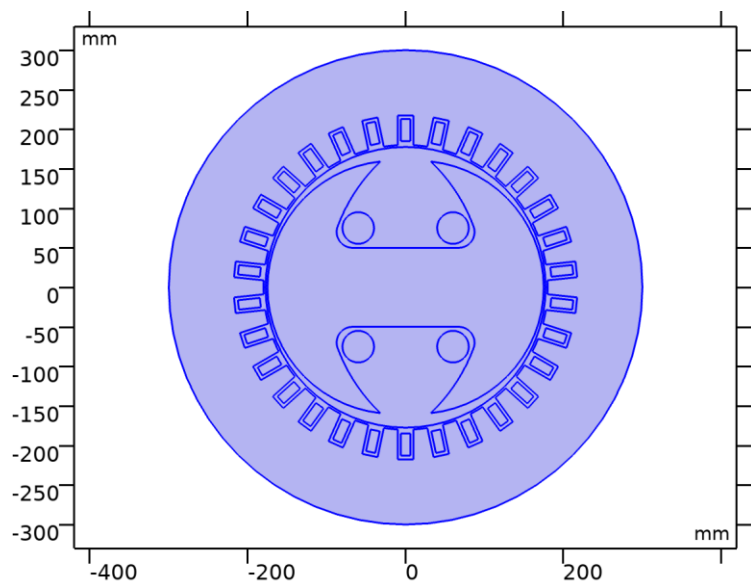
Rotating Machinery, Magnetic

EQUATIONS

Vector potential formulation (Ampère's law):

6

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

$$\mathbf{B} = \nabla \times \mathbf{A}$$

$$\mathbf{E} = -\frac{\partial \mathbf{A}}{\partial t}$$

Scalar potential formulation (Magnetic flux conservation):

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

FEATURES

Electric Field Transformation 1
Ampère's Law 1
Mixed Formulation Boundary 1
Magnetic Insulation 1
Initial Values 1
Continuity 1
External Current Density 1
External Current Density 2
Coil A
Coil B
Coil C
Electric Field Transformation 2

Ampère's Law 1

EQUATIONS

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

$$\mathbf{B} = \nabla \times \mathbf{A}$$

$$\mathbf{E} = -\frac{\partial \mathbf{A}}{\partial t}$$

$$\mathbf{J} = \sigma \mathbf{E}$$

Magnetic Insulation 1

EQUATIONS

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

Continuity 1

Magnetic Insulation 1

EQUATIONS

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

External Current Density 1

$$\mathbf{J} = \sigma\mathbf{E} + \mathbf{J}_e$$

External Current Density 2

$$\mathbf{J} = \sigma\mathbf{E} + \mathbf{J}_e$$

Coil A

$$\mathbf{J}_e = \frac{NI_{coil}}{A}\mathbf{e}_{coil}$$

Coil B

$$\mathbf{J}_e = \frac{NI_{coil}}{A}\mathbf{e}_{coil}$$

Coil C

$$\mathbf{J}_e = \frac{NI_{coil}}{A}\mathbf{e}_{coil}$$

MESH 1
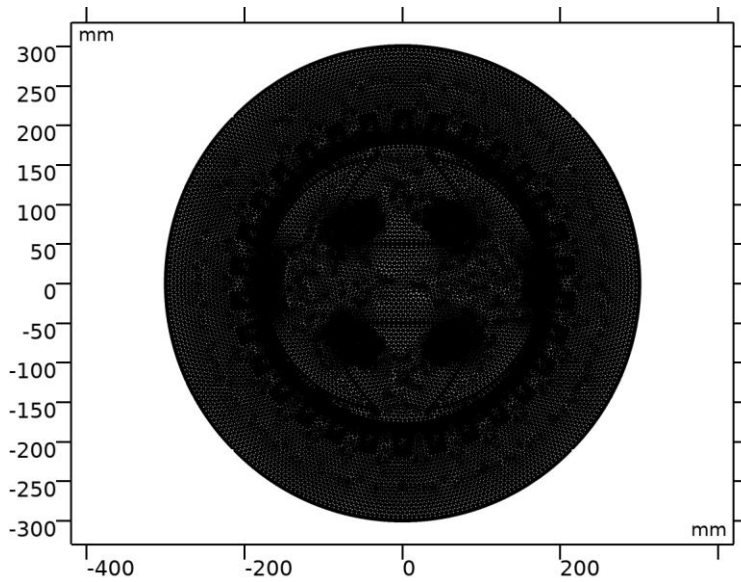
Mesh 1

Study 1

Computation time	1 min 32 s
CPU	Intel64 Family 6 Model 58 Stepping 9, 2 cores
Operating system	Windows 10

TIME DEPENDENT

Times	Unit
range(0,2.314814814814815e-4,0.016666666666666666)	s

STUDY SETTINGS

Description	Value
Include geometric nonlinearity	On

MESH SELECTION

Geometry	Mesh
mesh1	mesh1

PHYSICS AND VARIABLES SELECTION

Physics interface	Discretization
Rotating Machinery, Magnetic (rmm)	physics

Geometry	Mesh
Geometry 1 (geom1)	mesh1

Results

DATA SETS

Study 1/Solution 1

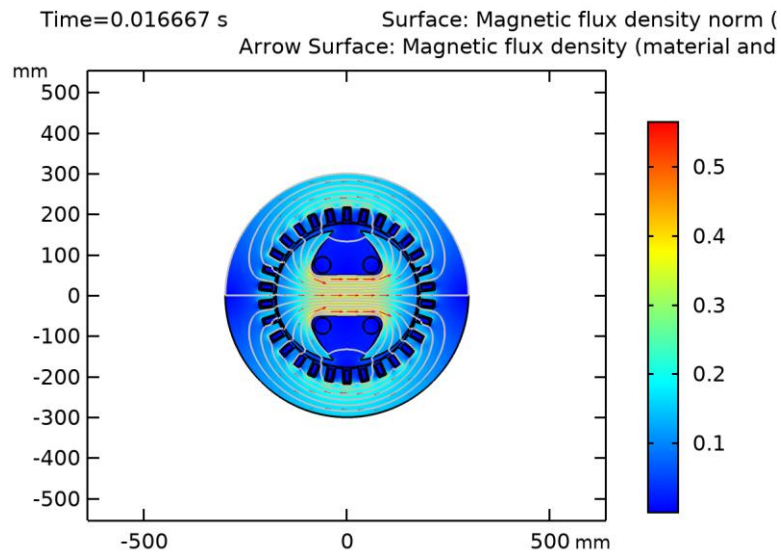### SOLUTION

Description	Value
Solution	Solution 1
Component	Save Point Geometry 1
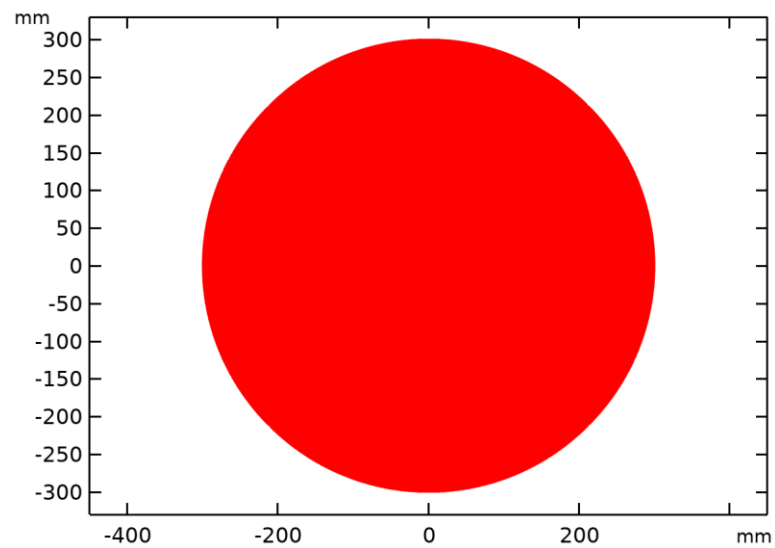
Data set: Study 1/Solution 1

PLOT GROUPS

Magnetic Flux Density (rmm)

Surface: Magnetic flux density norm (T) Arrow Surface: Magnetic flux density (material and geometry frames)