MFindtst

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Contents

1. Global Definitions

1.1. Parameters 1

Parameters

Name	Expression	Description
Sigma	1[S/m]	

2. Model 1 (mod1)

2.1. Definitions

2.1.1. Variables

Variables 1a

Selection

Geometric entity level	Entire model

Name	Expression	Description
EMF	intop1(nx*mf.Bx+ny*mf.By+nz*mf.Bz)*2*pi*freq	EMF voltage

2.1.2. Model Couplings

Integration 1

Coupling type	Integration
Operator name	intop1

Source selection

Geometric entity level	Boundary
Selection	Boundary 15

2.1.3. Coordinate Systems

Boundary System 1

Coordinate system type	Boundary system
Identifier	sys1

Settings

Name	Value
Coordinate names	{t1, t2, n}
Create first tangent direction from	Global Cartesian

Cylindrical System 2

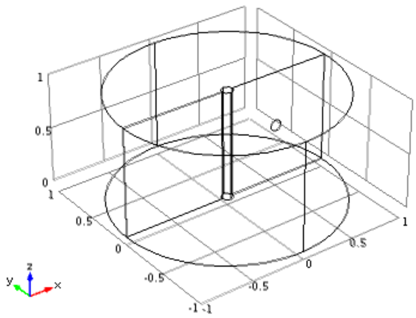
Coordinate system type	Cylindrical system
Identifier	sys2

Settings

Name	Value

Coordinate names	{r, phi, a}
Origin of system	{0, 0, 0}
Axis direction	{0, 0, 1}
Radial base vector direction (φ=0)	{1, 0, 0}

2.2. Geometry 1



Geometry 1

units

Length unit	m
Angular unit	deg

Geometry statistics

Property	Value
Space dimension	3
Number of domains	2
Number of boundaries	15
Number of edges	32
Number of vertices	20

2.2.1. Cylinder 1 (cyl1)

Settings

Name	Value
Position	{0, 0, 0}
Axis	{0, 0, 1}
Axis	{0, 0, 1}

2.2.2. Cylinder 2 (cyl2)

Settings

Name	Value
Position	{0, 0, 0}
Axis	{0, 0, 1}
Axis	{0, 0, 1}
Radius	0.05

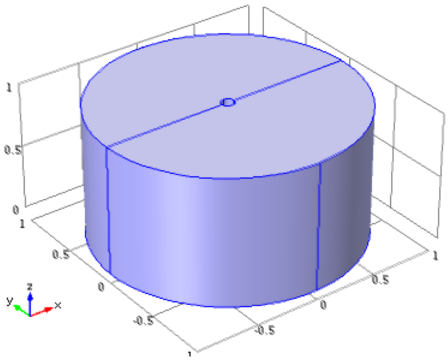
2.2.3. Work Plane 1 (wp1)

Settings

Name	Value
Plane	zx

2.3. Materials

2.3.1. Material 1



Material 1

Selection

Geometric entity level	Domain
Selection	Domains 1-2

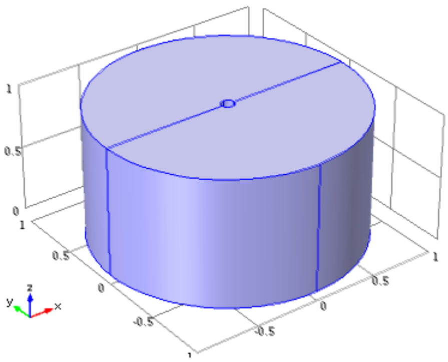
Material parameters

Name	Value	Unit
Relative permittivity	1	1
Relative permeability	1	1

Basic Settings

Description	Value
Electrical conductivity	{{1, 0, 0}, {0, 1, 0}, {0, 0, 1}}
Relative permittivity	{{1, 0, 0}, {0, 1, 0}, {0, 0, 1}}
Relative permeability	{{1, 0, 0}, {0, 1, 0}, {0, 0, 1}}

2.4. Magnetic Fields (mf)



Magnetic Fields

Selection

Geometric entity level	Domain
Selection	Domains 1-2

Equations

$$(j\omega\sigma - \omega^2\epsilon_0\epsilon_r)\mathbf{A} + \nabla\times\mathbf{H} = \mathbf{J}_e$$

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

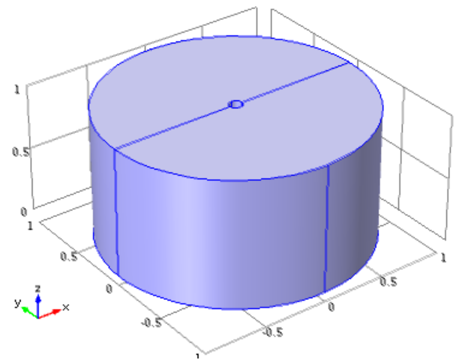
Settings

Description	Value
Show equation assuming	std1/freq

Used products

COMSOL Multiphysics
AC/DC Module

2.4.1. Ampère's Law 1



Ampère's Law 1

Selection

Geometric entity level	Domain
Selection	Domains 1-2

Equations

$$(j\omega\sigma - \omega^2\varepsilon_0\varepsilon_r)\mathbf{A} + \nabla\times(\mu_0^{-1}\mu_r^{-1}\mathbf{B}) = \mathbf{J}_e$$

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

Settings

Settings

Description	Value
Electrical conductivity	User defined
Electrical conductivity	{{Sigma, 0, 0}, {0, Sigma, 0}, {0, 0, Sigma}}

Properties from material

Property	Material	Property group
Relative permittivity	Material 1	Basic
Relative permeability	Material 1	Basic

Variables

Name	Expression	Unit	Description	Selection
mf.Bx	root.mod1.curlAx	T	Magnetic flux density, x component	Domains 1-2
mf.By	root.mod1.curlAy	T	Magnetic flux density, y component	Domains 1-2
mf.Bz	root.mod1.curlAz	T	Magnetic flux density, z component	Domains 1-2
mf.Ex	-mf.iomega*Ax	V/m	Electric field, x component	Domains 1-2
mf.Ey	-mf.iomega*Ay	V/m	Electric field, y component	Domains 1-2
mf.Ez	-mf.iomega*Az	V/m	Electric field, z component	Domains 1-2
mf.tEx	-mf.iomega*tAx	V/m	Tangential electric field, x component	Boundaries 1-15
mf.tEy	-mf.iomega*tAy	V/m	Tangential electric field, y component	Boundaries 1-15
mf.tEz	-mf.iomega*tAz	V/m	Tangential electric field, z component	Boundaries 1-15
mf.normB	sqrt(realdot(mf.Bx,mf.Bx)+realdot(mf.By,mf.By)+realdot(mf.Bz,mf.Bz))	T	Magnetic flux density norm	Domains 1-2
mf.dBdtx	mf.iomega*mf.Bx	V/m^2	Magnetic flux density, time derivative, x component	Domains 1-2
mf.dBdty	mf.iomega*mf.By	V/m^2	Magnetic flux density, time derivative, y component	Domains 1-2
mf.dBdtz	mf.iomega*mf.Bz	V/m^2	Magnetic flux density, time derivative, z component	Domains 1-2
mf.normE	sqrt(realdot(mf.Ex,mf.Ex)+realdot(mf.Ey,mf.Ey)+realdot(mf.Ez,mf.Ez))	V/m	Electric field norm	Domains 1-2
			Tangential electric	Domains 1-

mf.normtE	sqrt(realdot(mf.tEx,mf.tEx)+realdot(mf.tEy,mf.tEy)+realdot(mf.tEz,mf.tEz))	V/m	field norm	2
mf.Jex	0	A/m^2	External current density, x component	Domains 1-2
mf.Jey	0	A/m^2	External current density, y component	Domains 1-2
mf.Jez	0	A/m^2	External current density, z component	Domains 1-2
mf.Jx	mf.Jex+mf.Jix+mf.Jdx	A/m^2	Current density, x component	Domains 1-2
mf.Jy	mf.Jey+mf.Jiy+mf.Jdy	A/m^2	Current density, y component	Domains 1-2
mf.Jz	mf.Jez+mf.Jiz+mf.Jdz	A/m^2	Current density, z component	Domains 1-2
mf.normJ	sqrt(realdot(mf.Jx,mf.Jx)+realdot(mf.Jy,mf.Jy)+realdot(mf.Jz,mf.Jz))	A/m^2	Current density norm	Domains 1-2
mf.FLtzx	real(mf.Bz)*real(mf.Jy)-real(mf.By)*real(mf.Jz)	N/m^3	Lorentz force contribution, x component	Domains 1-2
mf.FLtzy	-real(mf.Bz)*real(mf.Jx)+real(mf.Bx)*real(mf.Jz)	N/m^3	Lorentz force contribution, y component	Domains 1-2
mf.FLtzz	real(mf.By)*real(mf.Jx)-real(mf.Bx)*real(mf.Jy)	N/m^3	Lorentz force contribution, z component	Domains 1-2
mf.FLtzavx	0.5*real(conj(mf.Bz)*mf.Jy-conj(mf.By)*mf.Jz)	N/m^3	Lorentz force contribution, time average, x component	Domains 1-2
mf.FLtzavy	0.5*real(-conj(mf.Bz)*mf.Jx+conj(mf.Bx)*mf.Jz)	N/m^3	Lorentz force contribution, time average, y component	Domains 1-2
mf.FLtzavz	0.5*real(conj(mf.By)*mf.Jx-conj(mf.Bx)*mf.Jy)	N/m^3	Lorentz force contribution, time average, z component	Domains 1-2
mf.FLtzrex	0.5*imag(conj(mf.Bz)*mf.Jy-conj(mf.By)*mf.Jz)	N/m^3	Lorentz force contribution, reactive, time average, x component	Domains 1-2
mf.FLtzrey	0.5*imag(-conj(mf.Bz)*mf.Jx+conj(mf.Bx)*mf.Jz)	N/m^3	Lorentz force contribution, reactive, time average, y component	Domains 1-2
mf.FLtzrez	0.5*imag(conj(mf.By)*mf.Jx-conj(mf.Bx)*mf.Jy)	N/m^3	Lorentz force contribution, reactive, time average, z component	Domains 1-2
mf.murxx	1	1	Relative permeability, xx component	Domains 1-2
mf.muryx	0	1	Relative permeability, yx component	Domains 1-2
mf.murzx	0	1	Relative permeability, zx component	Domains 1-2
mf.murxy	0	1	Relative permeability, xy component	Domains 1-2
mf.muryy	1	1	Relative permeability, yy component	Domains 1-2
mf.murzy	0	1	Relative permeability, zy component	Domains 1-2
mf.murxz	0	1	Relative permeability, xz component	Domains 1-2
mf.muryz	0	1	Relative permeability, yz component	Domains 1-2
mf.murzz	1	1	Relative permeability, zz component	Domains 1-2
			Relative	Domains 1-

mf.murAv	(mf.murxx+mf.muryy+mf.murzz)/3	1	permeability, average	2
mf.murinvxx	(mf.muryy*mf.murzz-mf.muryz*mf.murzy)/(mf.murxx*mf.muryy*mf.murzz+mf.murxy*mf.muryz*mf.murzx+mf.murxz*mf.muryx*mf.murzy-mf.murxx*mf.muryz*mf.murzy-mf.murxy*mf.muryx*mf.murzz-mf.murxz*mf.muryy*mf.murzx)	1	Inverse of relative permeability, xx component	Domains 1-2
mf.murinvyx	(mf.muryz*mf.murzx-mf.muryx*mf.murzz)/(mf.murxx*mf.muryy*mf.murzz+mf.murxy*mf.muryz*mf.murzx+mf.murxz*mf.muryx*mf.murzy-mf.murxx*mf.muryz*mf.murzy-mf.murxy*mf.muryx*mf.murzz-mf.murxz*mf.muryy*mf.murzx)	1	Inverse of relative permeability, yx component	Domains 1-2
mf.murinvzx	(mf.muryx*mf.murzy-mf.muryy*mf.murzx)/(mf.murxx*mf.muryy*mf.murzz+mf.murxy*mf.muryz*mf.murzx+mf.murxz*mf.muryx*mf.murzy-mf.murxx*mf.muryz*mf.murzy-mf.murxy*mf.muryx*mf.murzz-mf.murxz*mf.muryy*mf.murzx)	1	Inverse of relative permeability, zx component	Domains 1-2
mf.murinvxy	(mf.murxz*mf.murzy-mf.murxy*mf.murzz)/(mf.murxx*mf.muryy*mf.murzz+mf.murxy*mf.muryz*mf.murzx+mf.murxz*mf.muryx*mf.murzy-mf.murxx*mf.muryz*mf.murzy-mf.murxy*mf.muryx*mf.murzz-mf.murxz*mf.muryy*mf.murzx)	1	Inverse of relative permeability, xy component	Domains 1-2
mf.murinvyy	(mf.murxx*mf.murzz-mf.murxz*mf.murzx)/(mf.murxx*mf.muryy*mf.murzz+mf.murxy*mf.muryz*mf.murzx+mf.murxz*mf.muryx*mf.murzy-mf.murxx*mf.muryz*mf.murzy-mf.murxy*mf.muryx*mf.murzz-mf.murxz*mf.muryy*mf.murzx)	1	Inverse of relative permeability, yy component	Domains 1-2
mf.murinvzy	(mf.murxy*mf.murzx-mf.murxx*mf.murzy)/(mf.murxx*mf.muryy*mf.murzz+mf.murxy*mf.muryz*mf.murzx+mf.murxz*mf.muryx*mf.murzy-mf.murxx*mf.muryz*mf.murzy-mf.murxy*mf.muryx*mf.murzz-mf.murxz*mf.muryy*mf.murzx)	1	Inverse of relative permeability, zy component	Domains 1-2
mf.murinvxz	(mf.murxy*mf.muryz-mf.murxz*mf.muryy)/(mf.murxx*mf.muryy*mf.murzz+mf.murxy*mf.muryz*mf.murzx+mf.murxz*mf.muryx*mf.murzy-mf.murxx*mf.muryz*mf.murzy-mf.murxy*mf.muryx*mf.murzz-mf.murxz*mf.muryy*mf.murzx)	1	Inverse of relative permeability, xz component	Domains 1-2
mf.murinvyz	(mf.murxz*mf.muryx-mf.murxx*mf.muryz)/(mf.murxx*mf.muryy*mf.murzz+mf.murxy*mf.muryz*mf.murzx+mf.murxz*mf.muryx*mf.murzy-mf.murxx*mf.muryz*mf.murzy-mf.murxy*mf.muryx*mf.murzz-mf.murxz*mf.muryy*mf.murzx)	1	Inverse of relative permeability, yz component	Domains 1-2
mf.murinvzz	(mf.murxx*mf.muryy-mf.murxy*mf.muryx)/(mf.murxx*mf.muryy*mf.murzz+mf.murxy*mf.muryz*mf.murzx+mf.murxz*mf.muryx*mf.murzy-mf.murxx*mf.muryz*mf.murzy-mf.murxy*mf.muryx*mf.murzz-mf.murxz*mf.muryy*mf.murzx)	1	Inverse of relative permeability, zz component	Domains 1-2
mf.Hx	(mf.murinvxx*mf.Bx+mf.murinvxy*mf.By+mf.murinvxz*mf.Bz)/mu0_const	A/m	Magnetic field, x component	Domains 1-2
mf.Hy	(mf.murinvyx*mf.Bx+mf.murinvyy*mf.By+mf.murinvyz*mf.Bz)/mu0_const	A/m	Magnetic field, y component	Domains 1-2
mf.Hz	(mf.murinvzx*mf.Bx+mf.murinvzy*mf.By+mf.murinvzz*mf.Bz)/mu0_const	A/m	Magnetic field, z component	Domains 1-2
mf.normH	sqrt(realdot(mf.Hx,mf.Hx)+realdot(mf.Hy,mf.Hy)+realdot(mf.Hz,mf.Hz))	A/m	Magnetic field norm	Domains 1-2
mf.dHdtx	(mf.murinvxx*mf.dBdtx+mf.murinvxy*mf.dBdty+mf.murinvxz*mf.dBdtz)/mu0_const	A/(m*s)	Magnetic field, time derivative, x component	Domains 1-2
mf.dHdty	(mf.murinvyx*mf.dBdtx+mf.murinvyy*mf.dBdty+mf.murinvyz*mf.dBdtz)/mu0_const	A/(m*s)	Magnetic field, time derivative, y component	Domains 1-2
mf.dHdtz	(mf.murinvzx*mf.dBdtx+mf.murinvzy*mf.dBdty+mf.murinvzz*mf.dBdtz)/mu0_const	A/(m*s)	Magnetic field, time derivative, z component	Domains 1-2
mf.Mx	mf.Bx/mu0_const-mf.Hx	A/m	Magnetization, x component	Domains 1-2
mf.My	mf.By/mu0_const-mf.Hy	A/m	Magnetization, y component	Domains 1-2
mf.Mz	mf.Bz/mu0_const-mf.Hz	A/m	Magnetization, z component	Domains 1-2
mf.normM	sqrt(realdot(mf.Mx,mf.Mx)+realdot(mf.My,mf.My)+realdot(mf.Mz,mf.Mz))	A/m	Magnetization norm	Domains 1-2
mf.Qml	real(0.5*(mf.Bx*conj(mf.Hx)+mf.By*conj(mf.Hy)+mf.Bz*conj(mf.Hz))*mf.iomega)	W/m^3	Magnetic losses	Domains 1-2
mf.Qsh	0	W/m^2	Surface losses	Boundaries 1-15
mf.Qe	mf.Qml+mf.Qrh	W/m^3	Electromagnetic power loss density	Domains 1-2
mf.Qh	mf.Qml+mf.Qrh	W/m^3	Total power dissipation density	Domains 1-2
mf.Brx	0	T	Remanent flux density, x component	Domains 1-2
mf.Bry	0	T	Remanent flux density, y component	Domains 1-2
mf.Brz	0	T	Remanent flux density, z component	Domains 1-2
mf.normBr	0	T	Remanent flux density norm	Domains 1-2
mf.al1.input.Ex	model.input.E1	V/m	Electric field, x component	Global
mf.al1.input.Ey	model.input.E2	V/m	Electric field, y component	Global
mf.al1.input.Ez	model.input.E3	V/m	Electric field, z component	Global
			Electrical	Domains 1-

mf.sigmaxx	Sigma	S/m	conductivity, xx component	2
mf.sigmayx	0	S/m	Electrical conductivity, yx component	Domains 1-2
mf.sigmazx	0	S/m	Electrical conductivity, zx component	Domains 1-2
mf.sigmaxy	0	S/m	Electrical conductivity, xy component	Domains 1-2
mf.sigmayy	Sigma	S/m	Electrical conductivity, yy component	Domains 1-2
mf.sigmazy	0	S/m	Electrical conductivity, zy component	Domains 1-2
mf.sigmaxz	0	S/m	Electrical conductivity, xz component	Domains 1-2
mf.sigmayz	0	S/m	Electrical conductivity, yz component	Domains 1-2
mf.sigmazz	Sigma	S/m	Electrical conductivity, zz component	Domains 1-2
mf.Jix	mf.sigmaxx*mf.al1.input.Ex+mf.sigmaxy*mf.al1.input.Ey+mf.sigmaxz*mf.al1.input.Ez	A/m^2	Induced current density, x component	Domains 1-2
mf.Jiy	mf.sigmayx*mf.al1.input.Ex+mf.sigmayy*mf.al1.input.Ey+mf.sigmayz*mf.al1.input.Ez	A/m^2	Induced current density, y component	Domains 1-2
mf.Jiz	mf.sigmazx*mf.al1.input.Ex+mf.sigmazy*mf.al1.input.Ey+mf.sigmazz*mf.al1.input.Ez	A/m^2	Induced current density, z component	Domains 1-2
mf.Jdx	mf.iomega*mf.Dx	A/m^2	Displacement current density, x component	Domains 1-2
mf.Jdy	mf.iomega*mf.Dy	A/m^2	Displacement current density, y component	Domains 1-2
mf.Jdz	mf.iomega*mf.Dz	A/m^2	Displacement current density, z component	Domains 1-2
mf.epsilonrxx	1	1	Relative permittivity, xx component	Domains 1-2
mf.epsilonryx	0	1	Relative permittivity, yx component	Domains 1-2
mf.epsilonrzx	0	1	Relative permittivity, zx component	Domains 1-2
mf.epsilonrxy	0	1	Relative permittivity, xy component	Domains 1-2
mf.epsilonryy	1	1	Relative permittivity, yy component	Domains 1-2
mf.epsilonrzy	0	1	Relative permittivity, zy component	Domains 1-2
mf.epsilonrxz	0	1	Relative permittivity, xz component	Domains 1-2
mf.epsilonryz	0	1	Relative permittivity, yz component	Domains 1-2
mf.epsilonrzz	1	1	Relative permittivity, zz component	Domains 1-2
mf.Px	epsilon0_const*((-1+mf.epsilonrxx)*mf.al1.input.Ex+mf.epsilonrxy*mf.al1.input.Ey+mf.epsilonrxz*mf.al1.input.Ez)	C/m^2	Polarization, x component	Domains 1-2
mf.Py	epsilon0_const*(mf.epsilonryx*mf.al1.input.Ex+(-1+mf.epsilonryy)*mf.al1.input.Ey+mf.epsilonryz*mf.al1.input.Ez)	C/m^2	Polarization, y component	Domains 1-2
mf.Pz	epsilon0_const*(mf.epsilonrzx*mf.al1.input.Ex+mf.epsilonrzy*mf.al1.input.Ey+(-1+mf.epsilonrzz)*mf.al1.input.Ez)	C/m^2	Polarization, z component	Domains 1-2
mf.normP	sqrt(realdot(mf.Px,mf.Px)+realdot(mf.Py,mf.Py)+realdot(mf.Pz,mf.Pz))	C/m^2	Polarization norm	Domains 1-2
mf.epsrAv	(mf.epsilonrxx+mf.epsilonryy+mf.epsilonrzz)/3	1	Relative permittivity, average	Domains 1-2

mf.Dx	epsilon0_const*mf.al1.input.Ex+mf.Px	C/m^2	Electric displacement field, x component	Domains 1-2
mf.Dy	epsilon0_const*mf.al1.input.Ey+mf.Py	C/m^2	Electric displacement field, y component	Domains 1-2
mf.Dz	epsilon0_const*mf.al1.input.Ez+mf.Pz	C/m^2	Electric displacement field, z component	Domains 1-2
mf.normD	sqrt(realdot(mf.Dx,mf.Dx)+realdot(mf.Dy,mf.Dy)+realdot(mf.Dz,mf.Dz))	C/m^2	Electric displacement field norm	Domains 1-2
mf.Weav	0.25*(realdot(mf.Dx,model.input.E1)+realdot(mf.Dy,model.input.E2)+realdot(mf.Dz,model.input.E3))	J/m^3	Electric energy density time average	Domains 1-2
mf.Wav	mf.Weav+mf.Wmav	J/m^3	Energy density time average	Domains 1-2
mf.intWe	mf.intal11(mf.Weav)	J	Total electric energy	Global
mf.Qrh	0.5*(realdot(mf.Jx,model.input.E1)+realdot(mf.Jy,model.input.E2)+realdot(mf.Jz,model.input.E3))	W/m^3	Resistive losses	Domains 1-2
mf.Wmav	0.25*(realdot(mf.Bx,mf.Hx)+realdot(mf.By,mf.Hy)+realdot(mf.Bz,mf.Hz))	J/m^3	Magnetic energy density time average	Domains 1-2
mf.intWm	mf.intal12(mf.Wmav)	J	Total magnetic energy	Global
mf.unTmx	0.5*real(-0.5*dnx*(up(mf.Bx)*up(conj(mf.Hx))+up(mf.By)*up(conj(mf.Hy))+up(mf.Bz)*up(conj(mf.Hz))) +up(mf.Bx)*(up(conj(mf.Hx))*dnx+up(conj(mf.Hy))*dny+up(conj(mf.Hz))*dnz))	Pa	Maxwell upward magnetic surface stress tensor, x component	Boundaries 1-15
mf.unTmy	0.5*real(-0.5*dny*(up(mf.Bx)*up(conj(mf.Hx))+up(mf.By)*up(conj(mf.Hy))+up(mf.Bz)*up(conj(mf.Hz))) +up(mf.By)*(up(conj(mf.Hx))*dnx+up(conj(mf.Hy))*dny+up(conj(mf.Hz))*dnz))	Pa	Maxwell upward magnetic surface stress tensor, y component	Boundaries 1-15
mf.unTmz	0.5*real(-0.5*dnz*(up(mf.Bx)*up(conj(mf.Hx))+up(mf.By)*up(conj(mf.Hy))+up(mf.Bz)*up(conj(mf.Hz))) +up(mf.Bz)*(up(conj(mf.Hx))*dnx+up(conj(mf.Hy))*dny+up(conj(mf.Hz))*dnz))	Pa	Maxwell upward magnetic surface stress tensor, z component	Boundaries 1-15
mf.dnTmx	0.5*real(-0.5*unx*(down(mf.Bx)*down(conj(mf.Hx))+down(mf.By)*down(conj(mf.Hy))+down(mf.Bz) *down(conj(mf.Hz)))+down(mf.Bx)*(down(conj(mf.Hx))*unx+down(conj(mf.Hy))*uny+down(conj (mf.Hz))*unz))	Pa	Maxwell downward magnetic surface stress tensor, x component	Boundaries 1-15
mf.dnTmy	0.5*real(-0.5*uny*(down(mf.Bx)*down(conj(mf.Hx))+down(mf.By)*down(conj(mf.Hy))+down(mf.Bz) *down(conj(mf.Hz)))+down(mf.By)*(down(conj(mf.Hx))*unx+down(conj(mf.Hy))*uny+down(conj (mf.Hz))*unz))	Pa	Maxwell downward magnetic surface stress tensor, y component	Boundaries 1-15
mf.dnTmz	0.5*real(-0.5*unz*(down(mf.Bx)*down(conj(mf.Hx))+down(mf.By)*down(conj(mf.Hy))+down(mf.Bz) *down(conj(mf.Hz)))+down(mf.Bz)*(down(conj(mf.Hx))*unx+down(conj(mf.Hy))*uny+down(conj (mf.Hz))*unz))	Pa	Maxwell downward magnetic surface stress tensor, z component	Boundaries 1-15
mf.unTx	mf.unTmx+mf.unTex	Pa	Maxwell upward surface stress tensor, x component	Boundaries 1, 14-15
mf.unTy	mf.unTmy+mf.unTey	Pa	Maxwell upward surface stress tensor, y component	Boundaries 1, 14-15
mf.unTz	mf.unTmz+mf.unTez	Pa	Maxwell upward surface stress tensor, z component	Boundaries 1, 14-15
mf.unTx	0	Pa	Maxwell upward surface stress tensor, x component	Boundaries 2-13
mf.unTy	0	Pa	Maxwell upward surface stress tensor, y component	Boundaries 2-13
mf.unTz	0	Pa	Maxwell upward surface stress tensor, z component	Boundaries 2-13
mf.dnTx	mf.dnTmx+mf.dnTex	Pa	Maxwell downward surface stress tensor, x component	Boundaries 1-15
mf.dnTy	mf.dnTmy+mf.dnTey	Pa	Maxwell downward surface	Boundaries

			stress tensor, y component	1-15
mf.dnTz	mf.dnTmz+mf.dnTez	Pa	Maxwell downward surface stress tensor, z component	Boundaries 1-15
mf.unTex	0.5*real(-0.5*dnx*(up(mf.Dx)*up(conj(mf.Ex))+up(mf.Dy)*up(conj(mf.Ey))+up(mf.Dz)*up(conj(mf.Ez)))+up(mf.Dx)*(up(conj(mf.Ex))*dnx+up(conj(mf.Ey))*dny+up(conj(mf.Ez))*dnz))	Pa	Maxwell upward electric surface stress tensor, x component	Boundaries 1-15
mf.unTey	0.5*real(-0.5*dny*(up(mf.Dx)*up(conj(mf.Ex))+up(mf.Dy)*up(conj(mf.Ey))+up(mf.Dz)*up(conj(mf.Ez)))+up(mf.Dy)*(up(conj(mf.Ex))*dnx+up(conj(mf.Ey))*dny+up(conj(mf.Ez))*dnz))	Pa	Maxwell upward electric surface stress tensor, y component	Boundaries 1-15
mf.unTez	0.5*real(-0.5*dnz*(up(mf.Dx)*up(conj(mf.Ex))+up(mf.Dy)*up(conj(mf.Ey))+up(mf.Dz)*up(conj(mf.Ez)))+up(mf.Dz)*(up(conj(mf.Ex))*dnx+up(conj(mf.Ey))*dny+up(conj(mf.Ez))*dnz))	Pa	Maxwell upward electric surface stress tensor, z component	Boundaries 1-15
mf.dnTex	0.5*real(-0.5*unx*(down(mf.Dx)*down(conj(mf.Ex))+down(mf.Dy)*down(conj(mf.Ey))+down(mf.Dz)*down(conj(mf.Ez)))+down(mf.Dx)*(down(conj(mf.Ex))*unx+down(conj(mf.Ey))*uny+down(conj(mf.Ez))*unz))	Pa	Maxwell downward electric surface stress tensor, x component	Boundaries 1-15
mf.dnTey	0.5*real(-0.5*uny*(down(mf.Dx)*down(conj(mf.Ex))+down(mf.Dy)*down(conj(mf.Ey))+down(mf.Dz)*down(conj(mf.Ez)))+down(mf.Dy)*(down(conj(mf.Ex))*unx+down(conj(mf.Ey))*uny+down(conj(mf.Ez))*unz))	Pa	Maxwell downward electric surface stress tensor, y component	Boundaries 1-15
mf.dnTez	0.5*real(-0.5*unz*(down(mf.Dx)*down(conj(mf.Ex))+down(mf.Dy)*down(conj(mf.Ey))+down(mf.Dz)*down(conj(mf.Ez)))+down(mf.Dz)*(down(conj(mf.Ex))*unx+down(conj(mf.Ey))*uny+down(conj(mf.Ez))*unz))	Pa	Maxwell downward electric surface stress tensor, z component	Boundaries 1-15
mf.Poavx	real(0.5*(conj(mf.Hz)*model.input.E2-conj(mf.Hy)*model.input.E3))	W/m^2	Power flow, time average, x component	Domains 1-2
mf.Poavy	real(0.5*(-conj(mf.Hz)*model.input.E1+conj(mf.Hx)*model.input.E3))	W/m^2	Power flow, time average, y component	Domains 1-2
mf.Poavz	real(0.5*(conj(mf.Hy)*model.input.E1-conj(mf.Hx)*model.input.E2))	W/m^2	Power flow, time average, z component	Domains 1-2
mf.nPoav	mf.nx*real(0.5*(conj(mf.Hz)*model.input.E2-conj(mf.Hy)*model.input.E3))+mf.ny*real(0.5*(-conj(mf.Hz)*model.input.E1+conj(mf.Hx)*model.input.E3))+mf.nz*real(0.5*(conj(mf.Hy)*model.input.E1-conj(mf.Hx)*model.input.E2))	W/m^2	Power outflow, time average	Boundaries 1-15
mf.deltaS	1/real(sqrt(mf.iomega*mu0_const*(mf.murxx+mf.muryy+mf.murzz)*(mf.sigmaxx+mf.sigmayy+mf.sigmazz+mf.iomega*epsilon0_const*(mf.epsilonrxx+mf.epsilonryy+mf.epsilonrzz))/9))	m	Skin depth	Domains 1-2

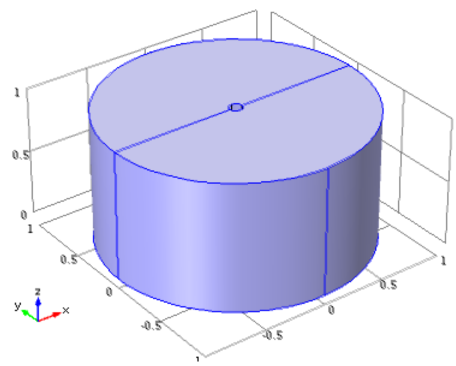
Shape Functions

Name	Shape function	Unit	Description	Shape frame	Selection
Ax	Curl	Wb/m	Magnetic vector potential, x component	Material	Domains 1-2
Ay	Curl	Wb/m	Magnetic vector potential, y component	Material	Domains 1-2
Az	Curl	Wb/m	Magnetic vector potential, z component	Material	Domains 1-2

Weak Expressions

Weak expression	Integration frame	Selection
-mf.Hx*test(root.mod1.curlAx)-mf.Hy*test(root.mod1.curlAy)-mf.Hz*test(root.mod1.curlAz)+mf.Jx*test(Ax)+mf.Jy*test(Ay)+mf.Jz*test(Az)	Material	Domains 1-2

2.4.2. Magnetic Insulation 1



Magnetic Insulation 1

Selection	
Geometric entity level	Boundary
Selection	Boundaries 2-7, 10, 13

Equations

$\mathbf{n} \times \mathbf{A} = 0$

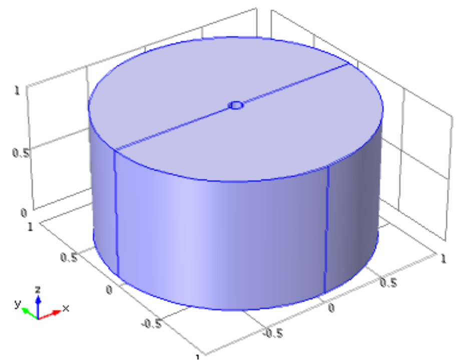
Variables

Name	Expression	Unit	Description	Selection
mf.Jsx	(up(mf.Hz)-down(mf.Hz))*dny+(-up(mf.Hy)+down(mf.Hy))*dnz	A/m	Surface current density, x component	Boundaries 2-7, 10, 13
mf.Jsy	(-up(mf.Hz)+down(mf.Hz))*dnx+(up(mf.Hx)-down(mf.Hx))*dnz	A/m	Surface current density, y component	Boundaries 2-7, 10, 13
mf.Jsz	(up(mf.Hy)-down(mf.Hy))*dnx+(-up(mf.Hx)+down(mf.Hx))*dny	A/m	Surface current density, z component	Boundaries 2-7, 10, 13
mf.normJs	sqrt(realdot(mf.Jsx,mf.Jsx)+realdot(mf.Jsy,mf.Jsy)+realdot(mf.Jsz,mf.Jsz))	A/m	Surface current norm	Boundaries 2-7, 10, 13
mf.A0x	0	Wb/m	Magnetic vector potential, x component	Boundaries 2-7, 10, 13
mf.A0y	0	Wb/m	Magnetic vector potential, y component	Boundaries 2-7, 10, 13
mf.A0z	0	Wb/m	Magnetic vector potential, z component	Boundaries 2-7, 10, 13

Constraints

Constraint	Constraint force	Shape function	Selection
mf.A0x-tAx	test(mf.A0x-tAx)	Curl	Boundaries 2-7, 10, 13
mf.A0y-tAy	test(mf.A0y-tAy)	Curl	Boundaries 2-7, 10, 13
mf.A0z-tAz	test(mf.A0z-tAz)	Curl	Boundaries 2-7, 10, 13

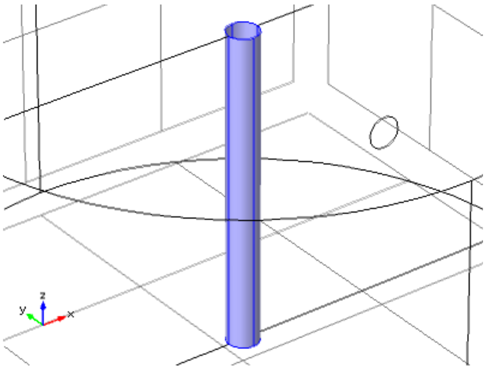
2.4.3. Initial Values 1



Initial Values 1

Selection	
Geometric entity level	Domain
Selection	Domains 1-2

2.4.4. Surface Current 1



Surface Current 1

Selection	
Geometric entity level	Boundary
Selection	Boundaries 8-9, 11-12

Equations

$\mathbf{n} \times (\mathbf{H}_1 - \mathbf{H}_2) = \mathbf{J}_{s0}$

Settings

Settings

Description	Value
Surface current density	{0, 0, 200[kA]/(2*pi*sys2.r)}

Variables

Name	Expression	Unit	Description	Selection
mf.Jsx	-0.5*mf.nx*200[kA]*mf.nz/(pi*sys2.r)	A/m	Surface current density, x component	Boundaries 8-9, 11-12
mf.Jsy	-0.5*mf.ny*200[kA]*mf.nz/(pi*sys2.r)	A/m	Surface current density, y component	Boundaries 8-9, 11-12
mf.Jsz	0.5*200[kA]*(mf.nx^2+mf.ny^2)/(pi*sys2.r)	A/m	Surface current density, z component	Boundaries 8-9, 11-12

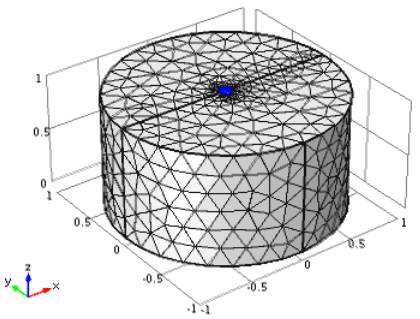
Weak Expressions

Weak expression	Integration frame	Selection
-0.5*200[kA]*(mf.nx*mf.nz*test(tAx)+mf.ny*mf.nz*test(tAy)-(mf.nx^2+mf.ny^2)*test(tAz))/(pi*sys2.r)	Material	Boundaries 8-9, 11-12

2.5. Mesh 1

Mesh statistics

Property	Value
Minimum element quality	0.141
Average element quality	0.7024
Tetrahedral elements	22927
Triangular elements	3291
Edge elements	323
Vertex elements	20



Mesh 1

2.5.1. Size (size)

Settings

Name	Value
Maximum element size	0.2
Minimum element size	0.036
Resolution of curvature	0.6
Resolution of narrow regions	0.5
Maximum element growth rate	1.5

3. Study 1

3.1. Parametric Sweep

Parameter name: Sigma

Parameters: 1 1e3 1e6 6e7

3.2. Frequency Domain

Frequencies: 1 50 250 1000

Mesh selection

Geometry	Mesh
Geometry 1 (geom1)	mesh1

Physics selection

Physics interface	Discretization
Magnetic Fields (mf)	physics

3.3. Solver Configurations

3.3.1. Solver 1

Compile Equations: Frequency Domain (st1)

Settings

Name	Value
Use study	Study 1
Use study step	Frequency Domain

Dependent Variables 1 (v1)

Settings

Name	Value
Defined by study step	Frequency Domain
Solution	Zero
Solution	Zero

Mod1.A (mod1_A)

Settings

Name	Value
Field components	{mod1.Ax, mod1.Ay, mod1.Az}

Stationary Solver 1 (s1)

Settings

Name	Value
Defined by study step	Frequency Domain

Log

```
Stationary Solver 1 in Solver 1 started at 24-mai-2012 12:15:34.
Parametric solver
Linear solver
Number of degrees of freedom solved for: 150604.

Parameter freq = 1.
Symmetric matrices found.
Scales for dependent variables:
mod1.A: 1
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.65    1    1    1     2   0.0002 2.9e-006

Parameter freq = 50.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.47    2    2    2     5  0.00058 1.7e-006

Parameter freq = 250.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.44    3    3    3     8  0.00058 1.3e-006

Parameter freq = 1000.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.43    4    4    4    12   0.0008 1.7e-006
Stationary Solver 1 in Solver 1: Solution time: 41 s.
```

Parametric 1 (p1)

Settings

Name	Value
Defined by study step	Frequency Domain
Parameter names	freq
Parameter values	{1, 50, 250, 1000}

Fully Coupled 1 (fc1)

Settings

Name	Value
Linear solver	Iterative 1

Iterative 1 (i1)

Settings

Name	Value
Solver	bicgstab

Multigrid 1 (mg1)

Settings

Name	Value
Use hierarchy in geometries	Geometry 1

Presmoother (pr)

SOR Vector 1 (sv1)

Settings

Name	Value
Variables	mod1.A

Postsmoother (po)

SOR Vector 1 (sv1)

Settings

Name	Value
Variables	mod1.A

3.3.2. Parametric 2

Store Solution 3 (su1)

Settings

Name	Value
Solution	Store Solution 3

Log

```
Stationary Solver 1 in Solver 1 started at 24-mai-2012 12:13:36.
Parametric solver
Linear solver
Number of degrees of freedom solved for: 150604.

Parameter freq = 1.
Symmetric matrices found.
Scales for dependent variables:
mod1.A: 1
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.56    1    1    1     2  0.00041   7e-006

Parameter freq = 50.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.72    2    2    2     5  0.00031 1.6e-008

Parameter freq = 250.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.85    3    3    3     7 7.4e-005   4e-008

Parameter freq = 1000.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.91    4    4    4     9 5.6e-005   3e-008
Stationary Solver 1 in Solver 1: Solution time: 36 s.
```

Store Solution 4 (su2)

Settings

Name	Value
Solution	Store Solution 4

Log

```
Stationary Solver 1 in Solver 1 started at 24-mai-2012 12:14:15.
Parametric solver
Linear solver
Number of degrees of freedom solved for: 150604.

Parameter freq = 1.
Symmetric matrices found.
Scales for dependent variables:
mod1.A: 1
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.91    1    1    1     2 1.5e-005   7e-006

Parameter freq = 50.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.93    2    2    2     4  0.00033 5.3e-007

Parameter freq = 250.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.93    3    3    3     6  0.00023 3.2e-006

Parameter freq = 1000.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.93    4    4    4     8  0.00013 7.7e-006
Stationary Solver 1 in Solver 1: Solution time: 35 s.
```

Store Solution 5 (su3)

Settings

Name	Value
Solution	Store Solution 5

Log

```
Stationary Solver 1 in Solver 1 started at 24-mai-2012 12:14:54.
Parametric solver
Linear solver
Number of degrees of freedom solved for: 150604.

Parameter freq = 1.
Symmetric matrices found.
Scales for dependent variables:
mod1.A: 1
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.93    1    1    1     2  0.00077 7.1e-005

Parameter freq = 50.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.66    2    2    2     5 6.7e-005 1.4e-006

Parameter freq = 250.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000         0.6    3    3    3     7  0.00065 5.2e-006

Parameter freq = 1000.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.53    4    4    4    10  0.00012   5e-007
Stationary Solver 1 in Solver 1: Solution time: 37 s.
```

Store Solution 6 (su4)

Settings

Name	Value
Solution	Store Solution 6

Log

```
Stationary Solver 1 in Solver 1 started at 24-mai-2012 12:15:34.
Parametric solver
Linear solver
Number of degrees of freedom solved for: 150604.

Parameter freq = 1.
Symmetric matrices found.
Scales for dependent variables:
mod1.A: 1
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.65    1    1    1     2   0.0002 2.9e-006

Parameter freq = 50.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.47    2    2    2     5  0.00058 1.7e-006

Parameter freq = 250.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.44    3    3    3     8  0.00058 1.3e-006

Parameter freq = 1000.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.43    4    4    4    12   0.0008 1.7e-006
Stationary Solver 1 in Solver 1: Solution time: 41 s.
```

3.3.3. Solver 1

Compile Equations: Frequency Domain (st1)

Settings

Name	Value
Use study	Study 1
Use study step	Frequency Domain

Dependent Variables 1 (v1)

Settings

Name	Value
Defined by study step	Frequency Domain
Solution	Zero
Solution	Zero

Mod1.A (mod1_A)

Settings

Name	Value
Field components	{mod1.Ax, mod1.Ay, mod1.Az}

Stationary Solver 1 (s1)

Settings

Name	Value

Defined by study step	Frequency Domain

Log

```
Stationary Solver 1 in Solver 1 started at 24-mai-2012 12:15:34.
Parametric solver
Linear solver
Number of degrees of freedom solved for: 150604.

Parameter freq = 1.
Symmetric matrices found.
Scales for dependent variables:
mod1.A: 1
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.65    1    1    1     2   0.0002 2.9e-006

Parameter freq = 50.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.47    2    2    2     5  0.00058 1.7e-006

Parameter freq = 250.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.44    3    3    3     8  0.00058 1.3e-006

Parameter freq = 1000.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.43    4    4    4    12   0.0008 1.7e-006
Stationary Solver 1 in Solver 1: Solution time: 41 s.
```

Parametric 1 (p1)

Settings

Name	Value
Defined by study step	Frequency Domain
Parameter names	freq
Parameter values	{1, 50, 250, 1000}

Fully Coupled 1 (fc1)

Settings

Name	Value
Linear solver	Iterative 1

Iterative 1 (i1)

Settings

Name	Value
Solver	bicgstab

Multigrid 1 (mg1)

Settings

Name	Value
Use hierarchy in geometries	Geometry 1

Presmoother (pr)

SOR Vector 1 (sv1)

Settings

Name	Value
Variables	mod1.A

Postsmoother (po)

SOR Vector 1 (sv1)

Settings

Name	Value
Variables	mod1.A

3.3.4. Solver 1

Compile Equations: Frequency Domain (st1)

Settings

Name	Value
Use study	Study 1
Use study step	Frequency Domain

Dependent Variables 1 (v1)

Settings

Name	Value
Defined by study step	Frequency Domain
Solution	Zero
Solution	Zero

Mod1.A (mod1_A)

Settings

Name	Value
Field components	{mod1.Ax, mod1.Ay, mod1.Az}

Stationary Solver 1 (s1)

Settings

Name	Value
Defined by study step	Frequency Domain

Log

```
Stationary Solver 1 in Solver 1 started at 24-mai-2012 12:15:34.
Parametric solver
Linear solver
Number of degrees of freedom solved for: 150604.

Parameter freq = 1.
Symmetric matrices found.
Scales for dependent variables:
mod1.A: 1
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.65    1    1    1     2   0.0002 2.9e-006

Parameter freq = 50.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.47    2    2    2     5  0.00058 1.7e-006

Parameter freq = 250.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.44    3    3    3     8  0.00058 1.3e-006

Parameter freq = 1000.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.43    4    4    4    12   0.0008 1.7e-006
Stationary Solver 1 in Solver 1: Solution time: 41 s.
```

Parametric 1 (p1)

Settings

Name	Value
Defined by study step	Frequency Domain
Parameter names	freq
Parameter values	{1, 50, 250, 1000}

Fully Coupled 1 (fc1)

Settings

Name	Value
Linear solver	Iterative 1

Iterative 1 (i1)

Settings

Name	Value
Solver	bicgstab

Multigrid 1 (mg1)

Settings

Name	Value
Use hierarchy in geometries	Geometry 1

Presmoother (pr)

SOR Vector 1 (sv1)

Settings

Name	Value
Variables	mod1.A

Postsmoother (po)

SOR Vector 1 (sv1)

Settings

Name	Value
Variables	mod1.A

3.3.5. Solver 1

Compile Equations: Frequency Domain (st1)

Settings

Name	Value
Use study	Study 1
Use study step	Frequency Domain

Dependent Variables 1 (v1)

Settings

Name	Value
Defined by study step	Frequency Domain
Solution	Zero
Solution	Zero

Mod1.A (mod1_A)

Settings

Name	Value
Field components	{mod1.Ax, mod1.Ay, mod1.Az}

Stationary Solver 1 (s1)

Settings

Name	Value
Defined by study step	Frequency Domain

Log

```
Stationary Solver 1 in Solver 1 started at 24-mai-2012 12:15:34.
Parametric solver
Linear solver
Number of degrees of freedom solved for: 150604.

Parameter freq = 1.
Symmetric matrices found.
Scales for dependent variables:
mod1.A: 1
Iter      Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1    1.0000000        0.65    1    1    1     2   0.0002 2.9e-006

Parameter freq = 50.
Iter      Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1    1.0000000        0.47    2    2    2     5  0.00058 1.7e-006

Parameter freq = 250.
Iter      Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1    1.0000000        0.44    3    3    3     8  0.00058 1.3e-006

Parameter freq = 1000.
Iter      Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1    1.0000000        0.43    4    4    4    12   0.0008 1.7e-006
Stationary Solver 1 in Solver 1: Solution time: 41 s.
```

Parametric 1 (p1)

Settings

Name	Value
Defined by study step	Frequency Domain
Parameter names	freq
Parameter values	{1, 50, 250, 1000}

Fully Coupled 1 (fc1)

Settings

Name	Value
Linear solver	Iterative 1

Iterative 1 (i1)

Settings

Name	Value
Solver	bicgstab

Multigrid 1 (mg1)

Settings

Name	Value
Use hierarchy in geometries	Geometry 1

Presmoother (pr)

SOR Vector 1 (sv1)

Settings

Name	Value
Variables	mod1.A

Postsmoother (po)

SOR Vector 1 (sv1)

Settings

Name	Value
Variables	mod1.A

3.3.6. Solver 1

Compile Equations: Frequency Domain (st1)

Settings

Name	Value
Use study	Study 1
Use study step	Frequency Domain

Dependent Variables 1 (v1)

Settings

Name	Value
Defined by study step	Frequency Domain
Solution	Zero
Solution	Zero

Mod1.A (mod1_A)

Settings

Name	Value
Field components	{mod1.Ax, mod1.Ay, mod1.Az}

Stationary Solver 1 (s1)

Settings

Name	Value
Defined by study step	Frequency Domain

Log

```
Stationary Solver 1 in Solver 1 started at 24-mai-2012 12:15:34.
Parametric solver
Linear solver
Number of degrees of freedom solved for: 150604.

Parameter freq = 1.
Symmetric matrices found.
Scales for dependent variables:
mod1.A: 1
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.65    1    1    1     2   0.0002 2.9e-006

Parameter freq = 50.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.47    2    2    2     5  0.00058 1.7e-006

Parameter freq = 250.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.44    3    3    3     8  0.00058 1.3e-006

Parameter freq = 1000.
Iter     Damping    Stepsize #Res #Jac #Sol LinIt   LinErr   LinRes
   1   1.0000000        0.43    4    4    4    12   0.0008 1.7e-006
Stationary Solver 1 in Solver 1: Solution time: 41 s.
```

Parametric 1 (p1)

Settings

Name	Value
Defined by study step	Frequency Domain
Parameter names	freq
Parameter values	{1, 50, 250, 1000}

Fully Coupled 1 (fc1)

Settings

Name	Value
Linear solver	Iterative 1

Iterative 1 (i1)

Settings

Name	Value
Solver	bicgstab

Multigrid 1 (mg1)

Settings

Name	Value
Use hierarchy in geometries	Geometry 1

Presmoother (pr)

SOR Vector 1 (sv1)

Settings

Name	Value
Variables	mod1.A

Postsmoother (po)

SOR Vector 1 (sv1)

Settings

Name	Value
Variables	mod1.A

4. Results

4.1. Data Sets

4.1.1. Solution 1

Selection

Geometric entity level	Domain
Selection	Geometry geom1

Settings

Name	Value
Solution	Solver 1
Model	Save Point Geometry 1

4.1.2. Surface 1

Selection

Geometric entity level	Boundary
Selection	Boundaries 14-15

Settings

Name	Value
Data set	Solution 2
x- and y-axes	xz

4.1.3. Cut Line 3D 1

Settings

Name	Value
Data set	Solution 2
Points	{{0, 0, 0.5}, {1, 0, 0.5}}

4.1.4. Solution 2

Selection

Geometric entity level	Domain
Selection	Geometry geom1

Settings

Name	Value
Solution	Parametric 2
Model	Save Point Geometry 1

4.2. Derived Values

4.2.1. Surface Integration 1

Selection

Geometric entity level	Boundary
Selection	Boundary 15

Settings

Name	Value
Data set	Solution 2
Expression	sqrt(mf.Bx^2+mf.By^2)*2*pi*freq
Unit	V
Description	sqrt(mf.Bx^2+mf.By^2)*2*pi*freq

4.2.2. Global Evaluation 1

Settings

Name	Value
Data set	Solution 2
Expression	EMF
Description	EMF

4.2.3. Global Evaluation 2

Settings

Name	Value
Data set	Solution 2
Expression	abs(EMF)
Description	abs(EMF)

4.2.4. Global Evaluation 3

Settings

Name	Value
Data set	Solution 2
Expression	atan2(imag(EMF),real(EMF))
Unit	°
Description	atan2(imag(EMF),real(EMF))

4.3. Tables

4.3.1. Table 1

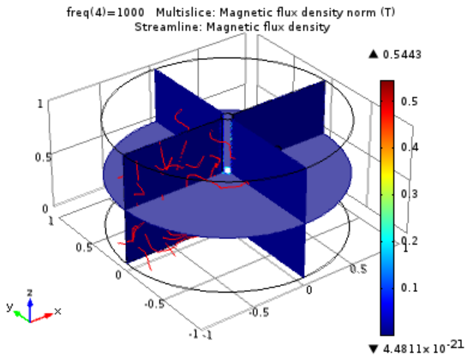
Global Evaluation 3 (atan2(imag(EMF),real(EMF)))

Table 1

freq	Sigma=1, sqrt (mf.Bx^2+mf.By^2) *2*pi*freq (V)	Sigma=1000, sqrt (mf.Bx^2+mf.By^2) *2*pi*freq (V)	Sigma=10e5, sqrt (mf.Bx^2+mf.By^2) *2*pi*freq (V)	Sigma=6e7, sqrt (mf.Bx^2+mf.By^2) *2*pi*freq (V)	Sigma=1, EMF	Sigma=1000, EMF	Sigma=10e5, EMF	Sigma=6e7, EMF	Sigma=1, abs (EMF)	Sigma abs(I
1	0.00396-4.50771e-9i	0.00396-4.50773e-6i	0.0019-0.00187i	9.59591e-6-3.66448e-6i	0.00396-4.50771e-9i	0.00396-4.50773e-6i	0.0019-0.00187i	9.59591e-6-3.66449e-6i	0.00396	0.0039
50	0.1979-1.12694e-5i	0.19721-0.01122i	9.01492e-4+2.02265e-4i	1.63392e-11-3.20103e-12i	0.1979-1.12694e-5i	0.19721-0.01122i	9.01492e-4+2.02265e-4i	-4.42854e-12+1.34434e-12i	0.1979	0.1975
250	0.98951-2.81733e-4i	0.911-0.25581i	1.69182e-6-8.40344e-7i	2.47657e-16+3.73795e-17i	0.98951-2.81733e-4i	0.911-0.25581i	1.18861e-6-1.76669e-6i	-3.09677e-17-1.74707e-17i	0.98951	0.9462
1000	3.95803-0.00451i	1.89927-1.87261i	6.96253e-11+1.01455e-12i	3.70857e-17+1.04069e-18i	3.95803-0.00451i	1.89927-1.87261i	-5.50819e-11+9.44101e-12i	1.50153e-18-3.38305e-19i	3.95804	2.6671

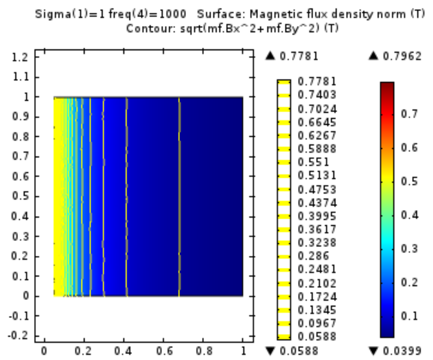
4.4. Plot Groups

4.4.1. Magnetic Flux Density (mf)



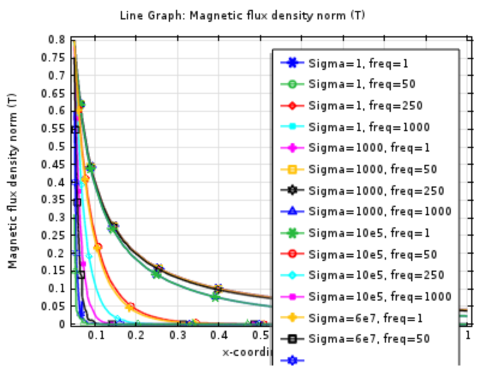
freq(4)=1000 Multislice: Magnetic flux density norm (T) Streamline: Magnetic flux density

4.4.2. 2D Plot Group 2



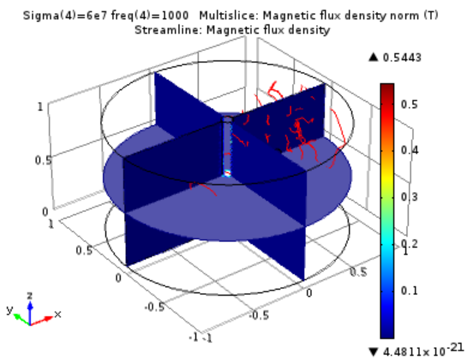
Sigma(1)=1 freq(4)=1000 Surface: Magnetic flux density norm (T) Contour: sqrt(mf.Bx^2+mf.By^2) (T)

4.4.3. 1D Plot Group 3



Line Graph: Magnetic flux density norm (T)

4.4.4. Magnetic Flux Density (mf) 1



Sigma(4)=6e7 freq(4)=1000 Multislice: Magnetic flux density norm (T) Streamline: Magnetic flux density