Three Core Fiber (3CF)

Report date

May 9, 2026, 5:57:45 PM

Contents

1 Global Definitions

Date	May 9, 2026, 5:48:29 PM

GLOBAL SETTINGS

Version	COMSOL Multiphysics 6.3 (Build: 290)

USED PRODUCTS

Wave Optics Module
COMSOL Multiphysics
Structural Mechanics Module

1.1 PARAMETERS

PARÁMETROS 1

Name	Expression	Value	Description
nSiO2	1.444	1.444	Refractive index, silica (SiO2)
nCore	1.450	1.45	Refractive index, core (doped SiO2)
B1	0.65e-12[m^2/N]	6.5E−13 1/Pa	First stress optical coefficient
B2	4.2e-12[m^2/N]	4.2E−12 1/Pa	Second stress optical coefficient
phi	0[deg]	0 rad	
long	1[m]	1 m	

2 Componente 1

SETTINGS

Description	Value
Unit system	Same as global system (SI)
Avoid inverted elements by curving interior domain elements	Off

2.1 DEFINITIONS

2.1.1 Variables

Variables 1

SELECTION

Geometric entity level	Domain
Selection	Geometry geom1: Dimension 2: Domains 1–2, 4, 7–8

Name	Expression	Unit	Description
N	nSiO2		

Variables 2

SELECTION

Geometric entity level	Domain
Selection	Geometry geom1: Dimension 2: Domains 3, 5–6

Name	Expression	Unit	Description
N	nCore		

Variables 3

SELECTION

Geometric entity level	Domain
Selection	Geometry geom1: Dimension 2: All domains

Name	Expression	Unit	Description
Nx	N - 1*(B1*solid.sx + B2*(solid.sy + solid.sz))		
Ny	N - 1*(B1*solid.sy + B2*(solid.sx + solid.sz))		
Nz	N - 1*(B1*solid.sz + B2*(solid.sx + solid.sy))		

Variables 4

SELECTION

Geometric entity level	Domain

Selection	Geometry geom1: Dimension 2: All domains

Name	Expression	Unit	Description
ka	ewfd.k0	rad/m	
kx	ka*cos(phi)*sin(theta)		
ky	0		
Edx	(-sin(phi)*exp(-i*(kx*x + 0)))*Efx		
E0x	-sin(phi)		
Efx	epsilon0_const*(ewfd.epsilonrxy - 1)*ewfd.Ex	C/m²	
Efy	epsilon0_const*(ewfd.epsilonryx - 1)*ewfd.Ey	C/m²	
Ebx	exp(-j*ewfd.k0*x)		
Eby	exp(-j*ewfd.k0*y)		
CEx	(cos(ewfd.k0*x)*cos(phi) + (j*sin(ewfd.k0*x)*sin(phi)))		
CEy	(cos(ewfd.k0*y)*sin(phi) - (j*sin(ewfd.k0*y)*cos(phi)))		
xp	Efx*cos(phi)	C/m²	
yp	Efy*sin(phi)	C/m²	
pol	xp + j*yp	C/m²	

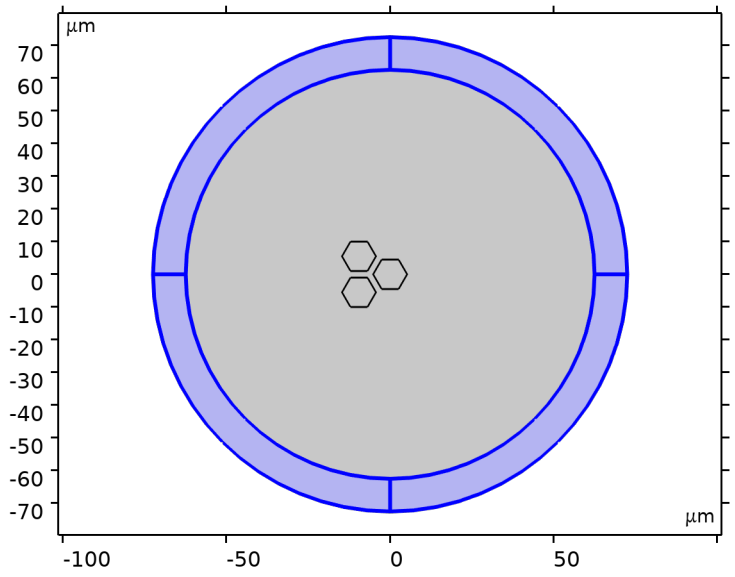
2.1.2 Artificial Domains

Perfectly Matched Layer 1

Tag	pml1

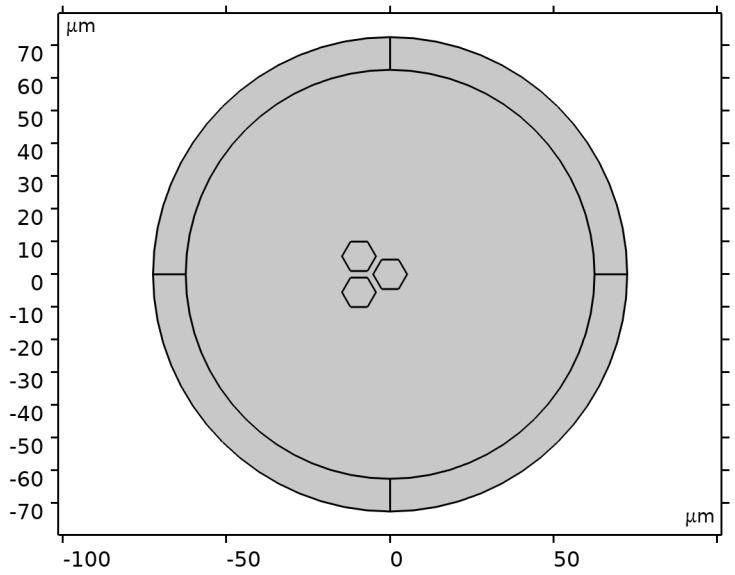
SELECTION

Geometric entity level	Domain
Selection	Geometry geom1: Dimension 2: Domains 1–2, 7–8



Selection

2.2 GEOMETRÍA 1



Geometría 1

UNITS

Length unit	µm
Angular unit	deg

2.2.1 Import 3 (imp3)

SOURCE

Description	Value

Description	Value
Source	DXF file
Filename	C:\Users\j_ace\OneDrive\Escritorio\F3N_bueno.DXF

2.2.2 Circle 1 (c1)

SIZE AND SHAPE

Description	Value
Radius	72.5

POSITION

Description	Value
Position	{0, 0}

LAYERS

Layer name	Thickness (µm)
Layer 1	10

2.2.3 Rotate 1 (rot1)

ROTATION

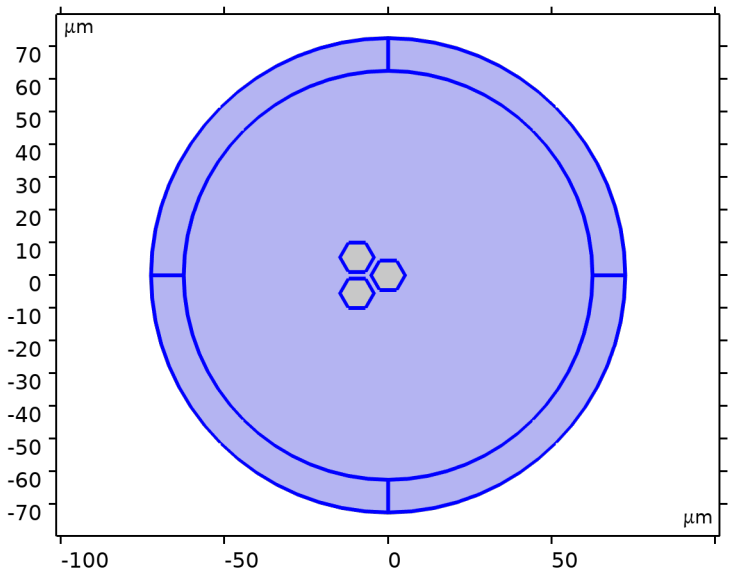
Description	Value
Angle	90

CENTER OF ROTATION

Description	Value
Position	{0, 0}

2.3 MATERIALS

2.3.1 Cladding

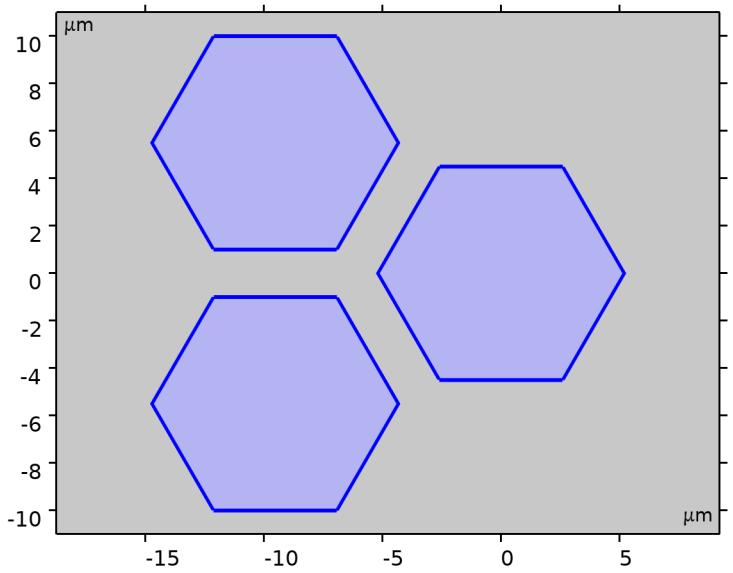


Cladding

SELECTION

Geometric entity level	Domain
Selection	Geometry geom1: Dimension 2: Domains 1–2, 4, 7–8

2.3.2 Core

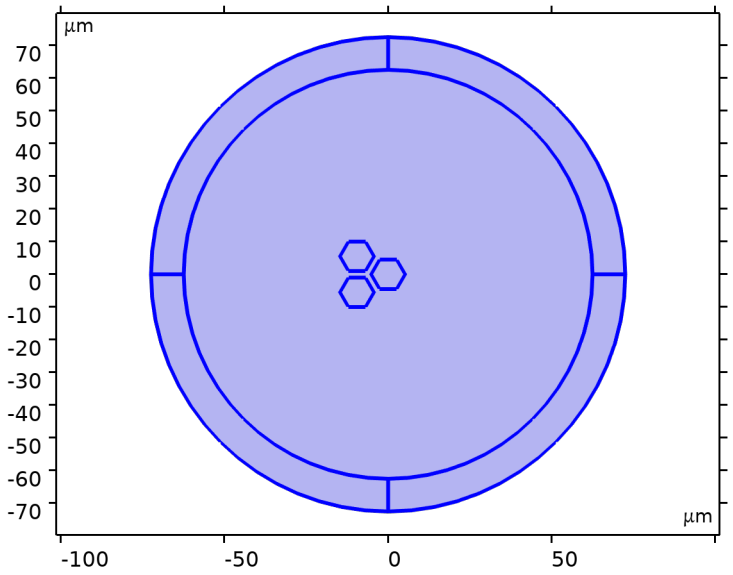


Core

SELECTION

Geometric entity level	Domain
Selection	Geometry geom1: Dimension 2: Domains 3, 5–6

2.4 SOLID MECHANICS

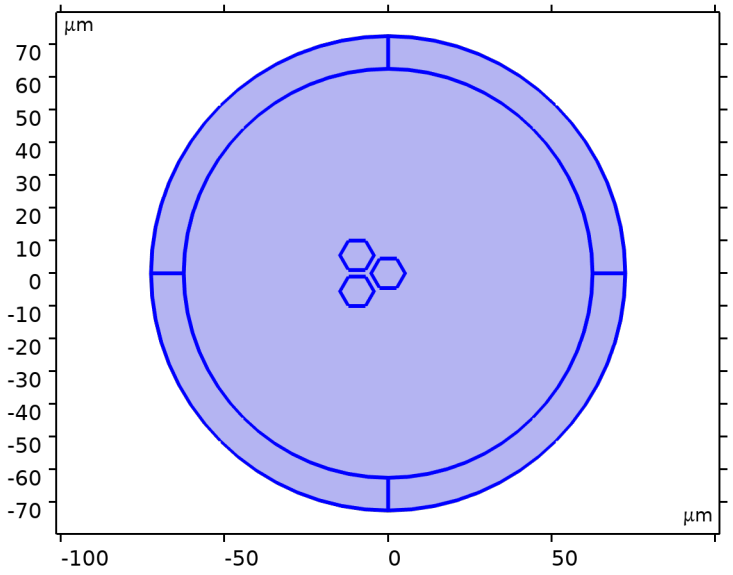


Solid Mechanics

FEATURES

Name	Level
Linear Elastic Material 1	Domain
Free 1	Boundary
Initial Values 1	Domain
Rigid Motion Suppression 1	Domain

2.5 ONDAS ELECTROMAGNÉTICAS, DOMINIO DE LA FRECUENCIA

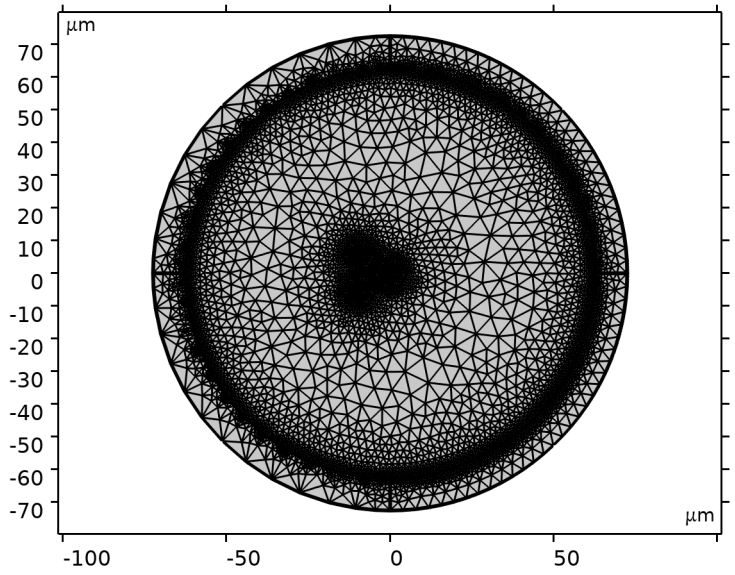


Ondas electromagnéticas, dominio de la frecuencia

FEATURES

Name	Level
Ecuación de onda eléctrica 1	Domain
Conductor eléctrico perfecto 1	Boundary
Valores iniciales 1	Domain
Polarization in X	Domain

2.6 MALLA 1



Malla 1

2.6.1 Size (size)

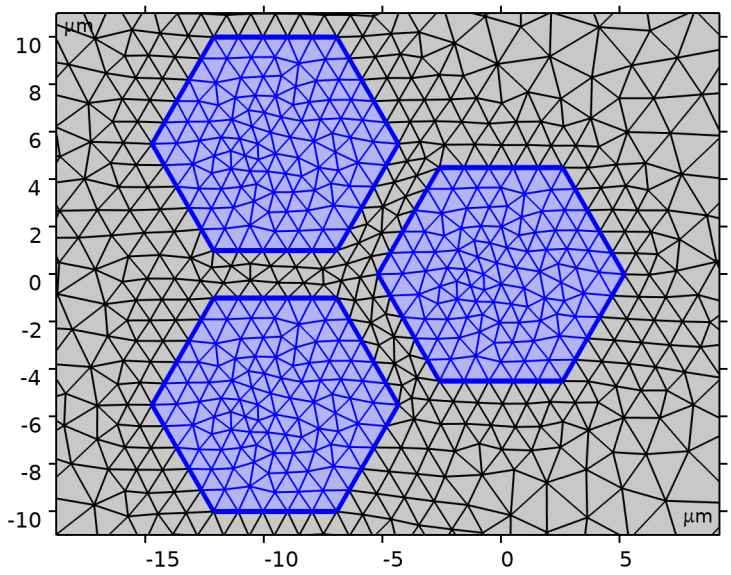
SETTINGS

Description	Value
Minimum element size	0.0175
Curvature factor	0.1
Maximum element growth rate	1
Predefined size	Fine
Custom element size	Custom

2.6.2 Free Triangular 1 (ftri1)

SELECTION

Geometric entity level	Domain
Selection	Geometry geom1: Dimension 2: Domains 3, 5–6



Free Triangular 1

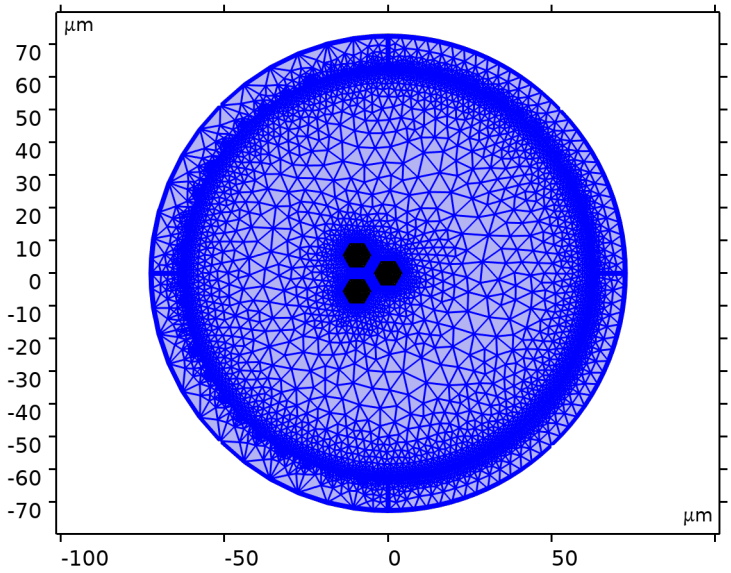
INFORMATION

Description	Value
Last build time	Unknown

2.6.3 Size 1 (size1)

SELECTION

Geometric entity level	Domain
Selection	Geometry geom1: Dimension 2: Domains 1–2, 4, 7–8



Size 1

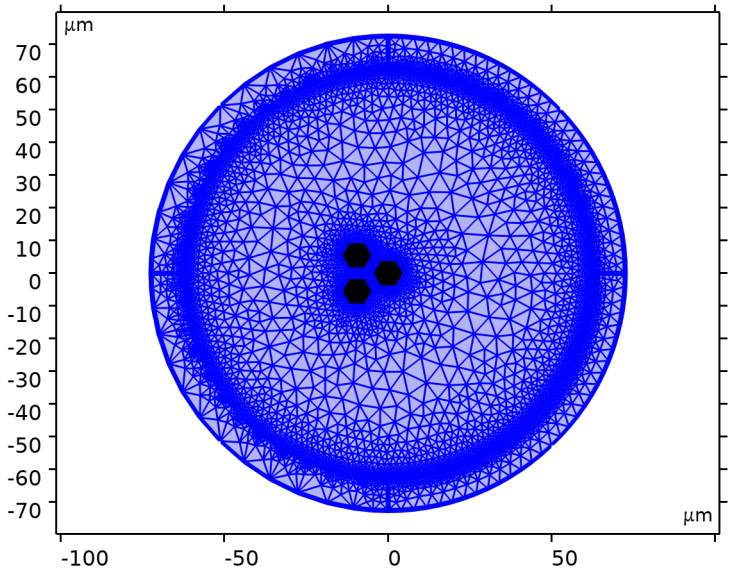
SETTINGS

Description	Value
Maximum element size	9.72
Minimum element size	0.0435
Curvature factor	0.3
Maximum element growth rate	1.3

2.6.4 Free Triangular 2 (ftri2)

SELECTION

Geometric entity level	Domain
Selection	Geometry geom1: Dimension 2: Domains 1–2, 4, 7–8



Free Triangular 2

INFORMATION

Description	Value
Last build time	Unknown

3 Study 1

COMPUTATION INFORMATION

Computation time	3 min 34 s

3.1 PARAMETRIC SWEEP

Parameter name	Parameter value list	Parameter unit
long	range(1.5e-6,10e-9,1.6e-6)	m

STUDY SETTINGS

Description	Value
Sweep type	Specified combinations
Parameter name	long
Unit	m

PARAMETERS

Parameter name	Parameter value list	Parameter unit
long	range(1.5e-6,10e-9,1.6e-6)	m

3.2 STATIONARY

STUDY SETTINGS

Description	Value
Include geometric nonlinearity	Off

STUDY SETTINGS

Description	Value
Tolerance	User controlled
Relative tolerance	0.005

PHYSICS AND VARIABLES SELECTION

Key	Solve for
Solid Mechanics (solid)	On
Ondas electromagnéticas, dominio de la frecuencia (ewfd)	Off

STORE IN OUTPUT

Interface	Output	Selection
Solid Mechanics (solid)	Physics controlled	
Ondas electromagnéticas, dominio de la frecuencia (ewfd)	Physics controlled	

MESH SELECTION

Component	Mesh
Componente 1	Malla 1

3.3 MODE ANALYSIS

STUDY SETTINGS

Description	Value
Include geometric nonlinearity	On

STUDY SETTINGS

Description	Value
Include geometric nonlinearity	On
Transform	Effective mode index
Mode analysis frequency	c_const/long
Desired number of modes	On
Unit	
Search for modes around shift	1.45
Search for modes around shift	On

VALUES OF LINEARIZATION POINT

Description	Value
Settings	User controlled
Method	Solution
Study	Study 1

PHYSICS AND VARIABLES SELECTION

Key	Solve for
Solid Mechanics (solid)	Off
Ondas electromagnéticas, dominio de la frecuencia (ewfd)	On

STORE IN OUTPUT

Interface	Output	Selection
Solid Mechanics (solid)	Physics controlled	
Ondas electromagnéticas, dominio de la frecuencia (ewfd)	Physics controlled	

MESH SELECTION

Component	Mesh
Componente 1	Malla 1

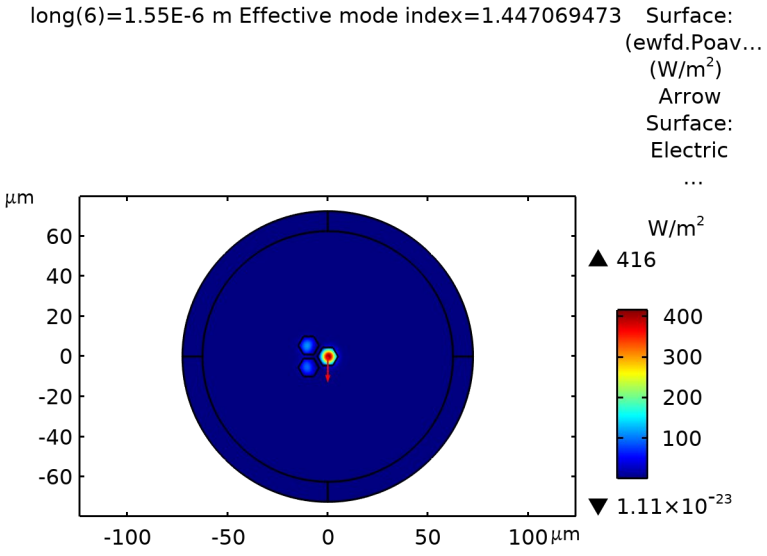
SETTINGS

Description	Value
Sort based on transformed eigenvalues	Off

4 Resultados

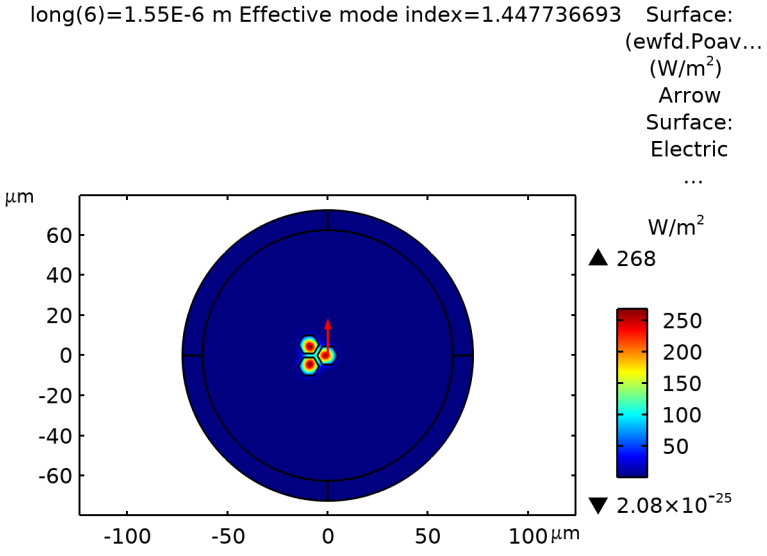
4.1 PLOT GROUPS

4.1.1 Electric Field



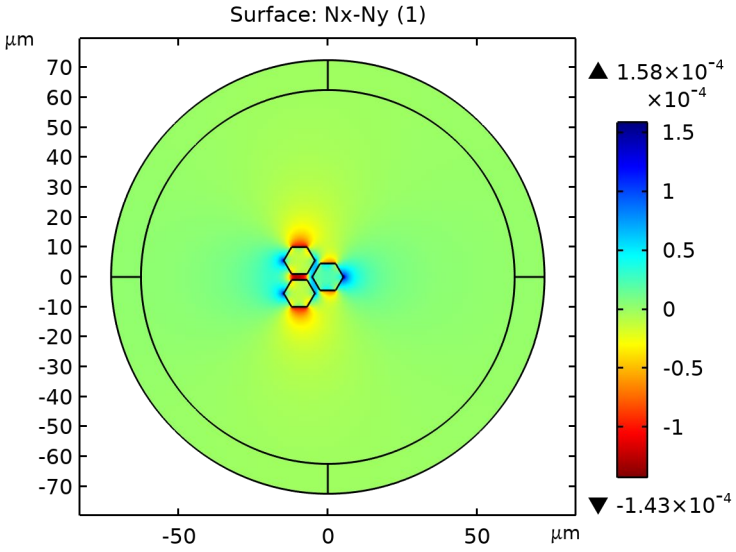
Surface: (ewfd.Poavz) (W/m²) Arrow Surface: Electric field (spatial frame)

4.1.2 Electric Field 1



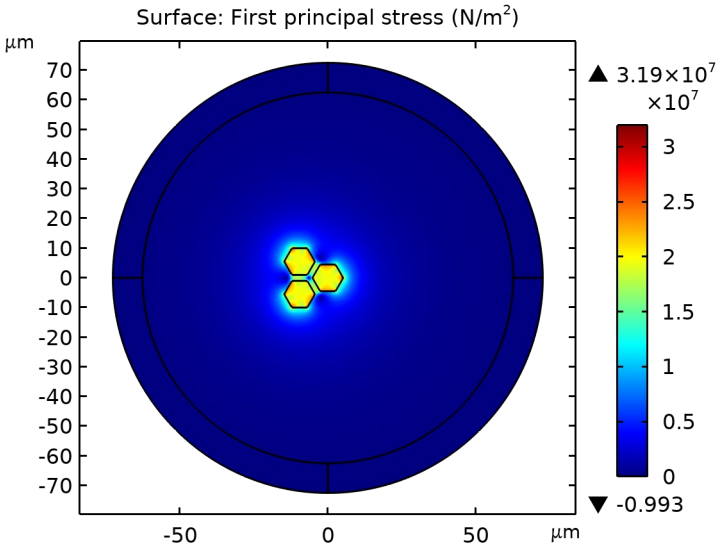
Surface: (ewfd.Poavz) (W/m²) Arrow Surface: Electric field (spatial frame)

4.1.3 BIRREFRINGENCIA



Surface: Nx-Ny (1)

4.1.4 Stress



Surface: First principal stress (N/m^2)