

Simulation Parameter <

STUDIES

FDTD draft

Editor

CONFIGURATION

Simulation Domain

Run Time

Grid Specification

Boundary and Symmetry

Shutoff Condition

Show More

STRUCTURES

SOURCES

MONITORS

SCRIPT OBJECTS

3D Chart

2D Chart

Task Details

Run

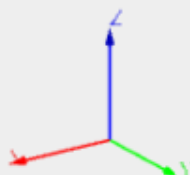
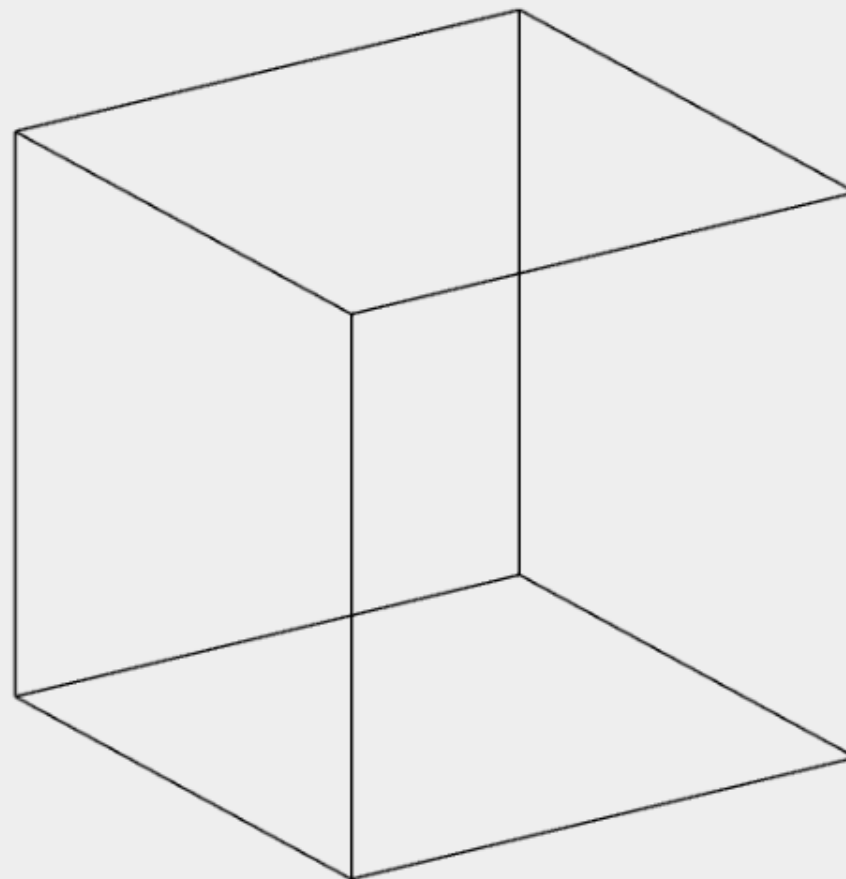
1 Error

Detail

Visibility

Axes

Simulation Domain



Simulation Parameter <

3D Chart 2D Chart Task Details Run

1 Error Detail

> Visibility

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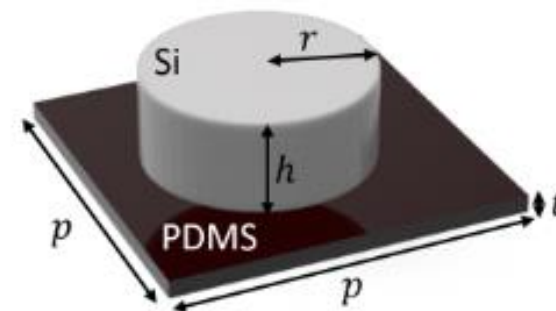
SCRIPT OBJECTS

## Dielectric Metasurface Absorber

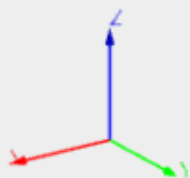
Metasurface



Unit cell



<https://docs.flexcompute.com/projects/tidy3d/en/latest/notebooks/DielectricMetasurfaceAbsorber.html>



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SCRIPT OBJECTS

Simulation Domain Help

center + size bounds

center \* size

X	0	$\mu\text{m}$	X	330	$\mu\text{m}$
Y	0	$\mu\text{m}$	Y	330	$\mu\text{m}$
Z	0	$\mu\text{m}$	Z	1000	$\mu\text{m}$

\* background medium

Vacuum

type: Medium

permittivity: 1 conductivity: 0 S/ $\mu\text{m}$

Apply

Task Details

Run

Validation pass

3D visualization of a rectangular simulation domain with a coordinate system (X, Y, Z) at the bottom left. The domain is a rectangular prism with dimensions 330x330x1000 micrometers.

Visibility

Symmetry

Axes

Simulation Domain

Sources (0/1)

Monitors (0/3)

SimulationParameter

> Variable

> Constant

- c
- pi
- inf

> Medium

- Vacuum
- PDMS
- Si

Edit Medium

Help

\* name

PDMS

\* type

Medium

☐ permittivity

☒ refractive index

\* n

1.31515

\* k

0.09809

☒ wavelength

☐ frequency

6e+11

μm

Warning: refractive index is accurate only at the wavelength or frequency specified above

Load from Library

Apply

Task Details

Run

Validation pass

Visibility

- Symmetry
- Axes
- Simulation Domain
  - > Sources(0/1)
  - > Monitors(0/3)

3D View

+

-

↺

?

Simulation Parameter

- > Variable
- Constant
  - c
  - pi
  - inf
- Medium
  - Vacuum
  - PDMS
  - Si

Edit Medium Help

\* name

Si

\* type

Drude

frequency\_range

min

Hz

max

Hz

eps\_inf

11.7

\* coeffs

f

6.9e+11

Hz

 $\delta$ 

8.3e+11

Hz

Add Coefficient

Load from Library

Apply

Task Details

Run

Validation pass

Visibility

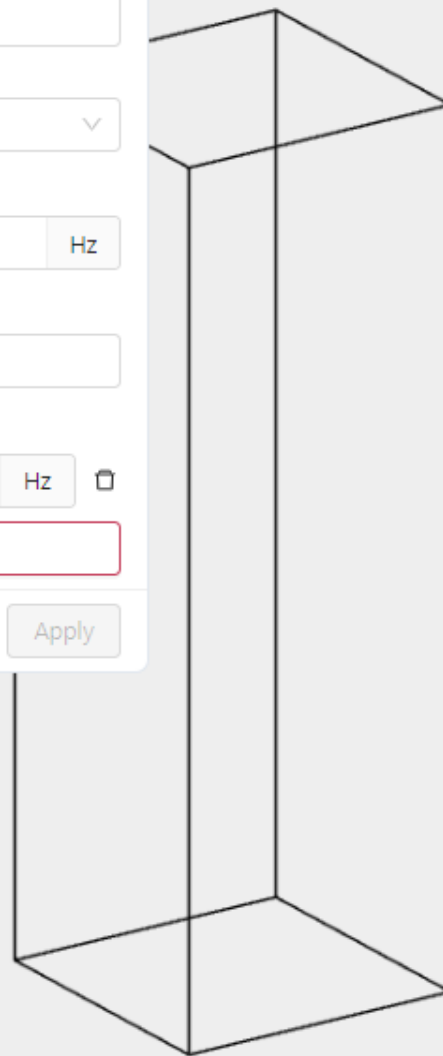
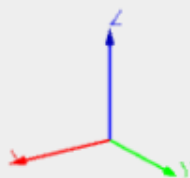
Symmetry

Axes

Simulation Domain

Sources(0/1)

Monitors(0/3)



Simulation Parameter <

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CONFIGURATION

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- Boundary and Symmetry
- Shutoff Condition
- Show More

STRUCTURES

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MONITORS

SCRIPT OBJECTS

Add Structure Help

Primitive Geometries

Box Sphere Cylinder

PolySlab GeometryGroup

Import Geometries from

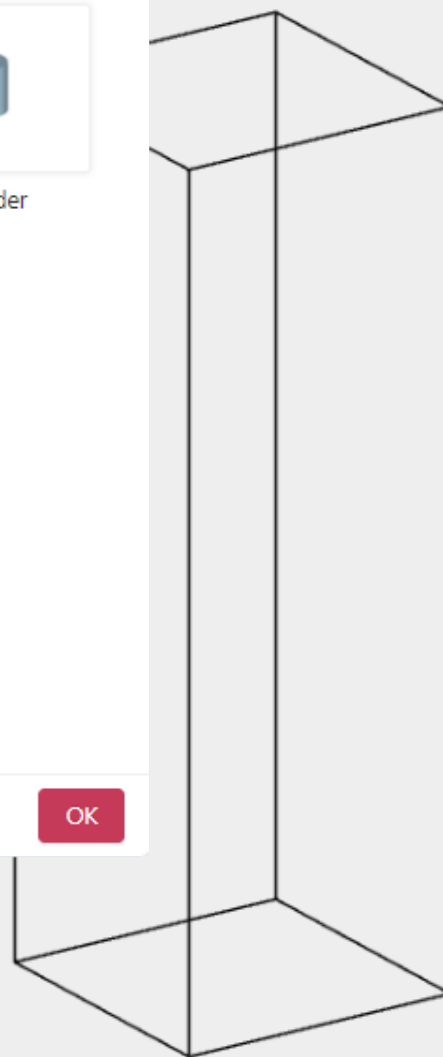
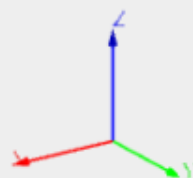
2D Layout

OK

Validation pass

Visibility

- Symmetry
- Axes
- Simulation Domain
- Sources(0/1)
- Monitors(0/3)



SimulationParameter

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STRUCTURES

pdms

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MONITORS

SCRIPT OBJECTS

Edit Structure

name

pdms

\* geometry

Box

center + size

bounds

center

X

0

μm

Y

0

μm

Z

-4

μm

size

X

Infinity

μm

Y

Infinity

μm

Z

8

μm

\* medium

PDMS

type: Medium

n: 1.31515

k: 0.09809

wavelength: 6e+11 μm

Apply

Task Details

Run

Validation pass

Visibility

Symmetry

Axes

Simulation Domain

Sources0/1

Monitors0/3

Structures1/1

pdms

3D Viewport

3D Model

Apply

+

-

↺

?

SimulationParameter<<

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STRUCTURES

pdms

cylinder\_resonator

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MONITORS

SCRIPT OBJECTS

Edit StructureHelp

\* geometry

Cylinder

axis

z

☒ center + size

☐ bounds

center

Z42.5μm

\* length

Z85μm

\* radius

106μm

center

X0μm

Y0μm

Advanced>

\* medium

Si

Apply

Task DetailsRun

3D visualization of a cylinder resonator structure within a simulation domain.

+

-

↺

?

Validation pass

>I Visibility

Symmetry

Axes

Simulation Domain

> Sources(0/1)

> Monitors(0/3)

> Structures(2/2)

pdms

cylinder\_resonator



Simulation Parameter

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- pdms
- cylinder\_resonator

SOURCES

- plane\_wave

MONITORS

- T
- R
- field

SCRIPT OBJECTS

3D Chart

2D Chart

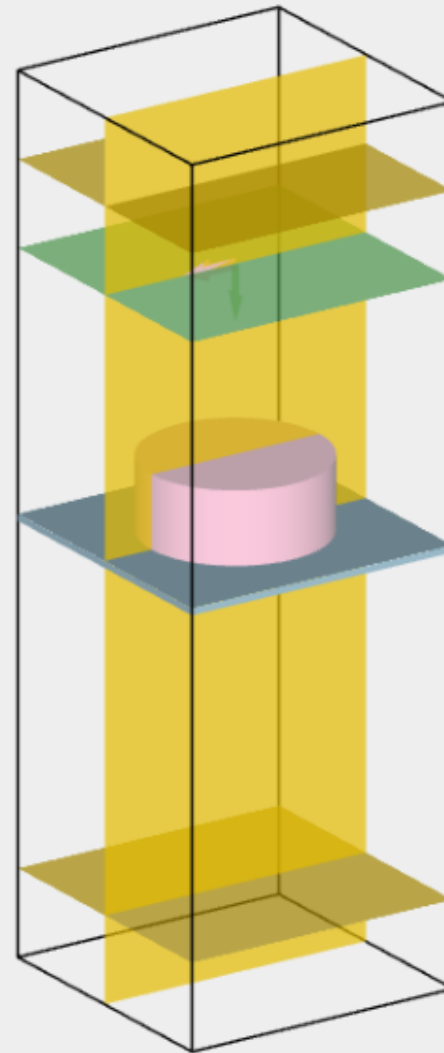
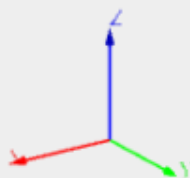
Task Details

Run

Validation pass

Visibility

- Symmetry
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- Structures(2/2)
  - pdms
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Simulation Parameter &lt;

STUDIES

FDTD success

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MONITORS

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R

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SCRIPT OBJECTS

3D Chart

2D Chart

Post-Run Result

Task Details

Edit



## Task finished successfully

Task Name: Tutorial 3 - Structures

Task Id: fdve-b161256b-9aa9-4177-af49-b856eb1e9476v1



Queued



Preprocess



Running Solver

Field decay: 7.56e-06



Postprocess

Early Shutoff

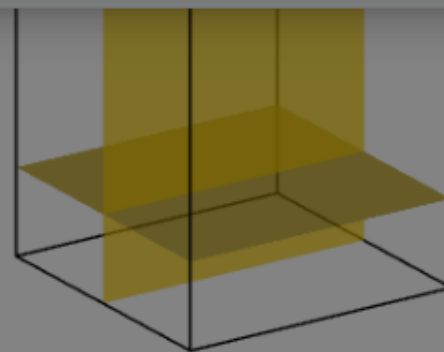
Steps: 23496/48951 (48%)

Solver Time: 10 seconds

Go to Post-Run Result

Download Data (263 kB)

Go To Post-Run Result



&gt; Visibility

Symmetry

Axes

Simulation Domain

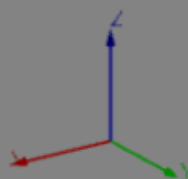
&gt; Sources(1/1)

&gt; Monitors(3/3)

Structures(2/2)

pdms

cylinder\_resonator



Simulation Parameter &lt;

STUDIES

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SCRIPT OBJECTS

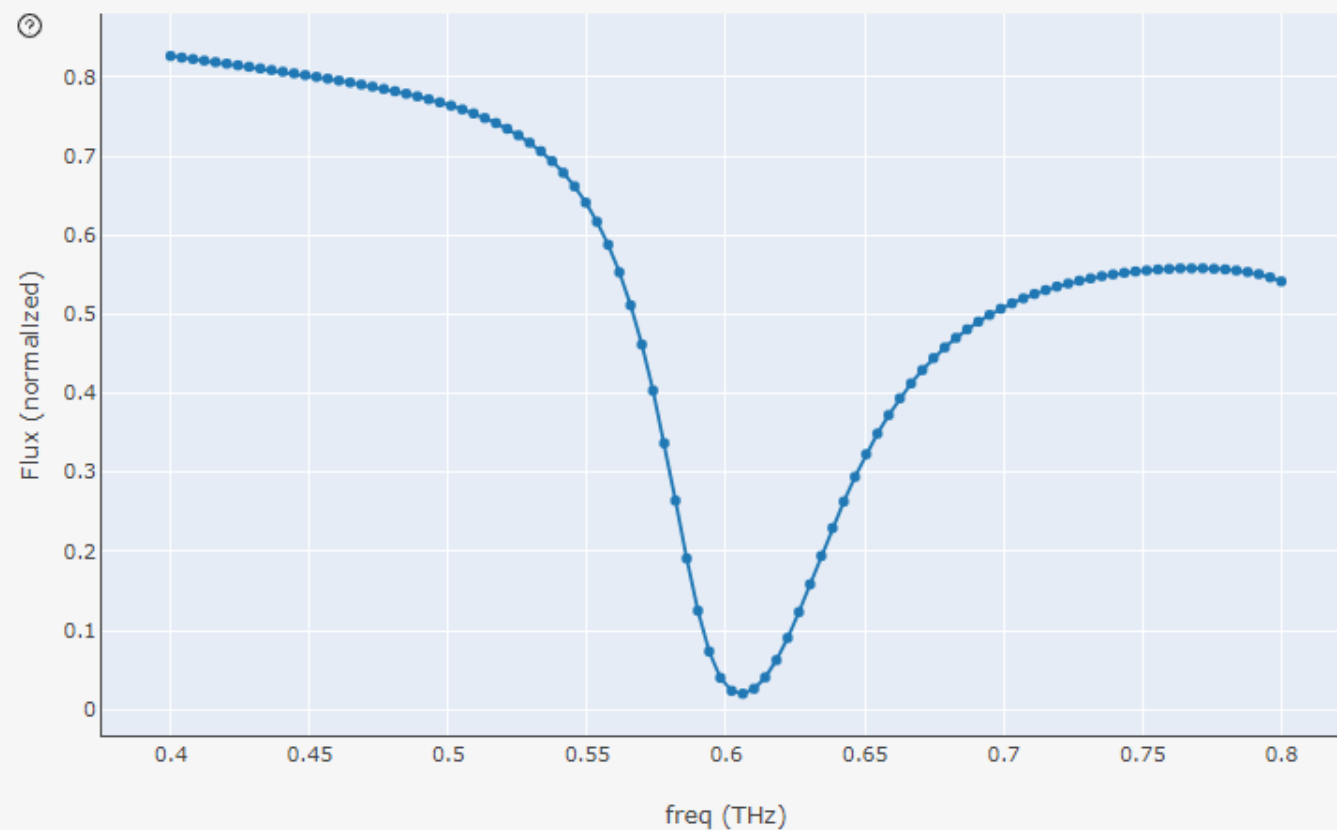
3D Chart

2D Chart

Post-Run Result

Task Details

Edit



Download Data

&gt; Result

Monitor Name

T

Type: FluxMonitor

Operation

Select operation



Simulation Parameter &lt;

STUDIES

FDTD success

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SCRIPT OBJECTS

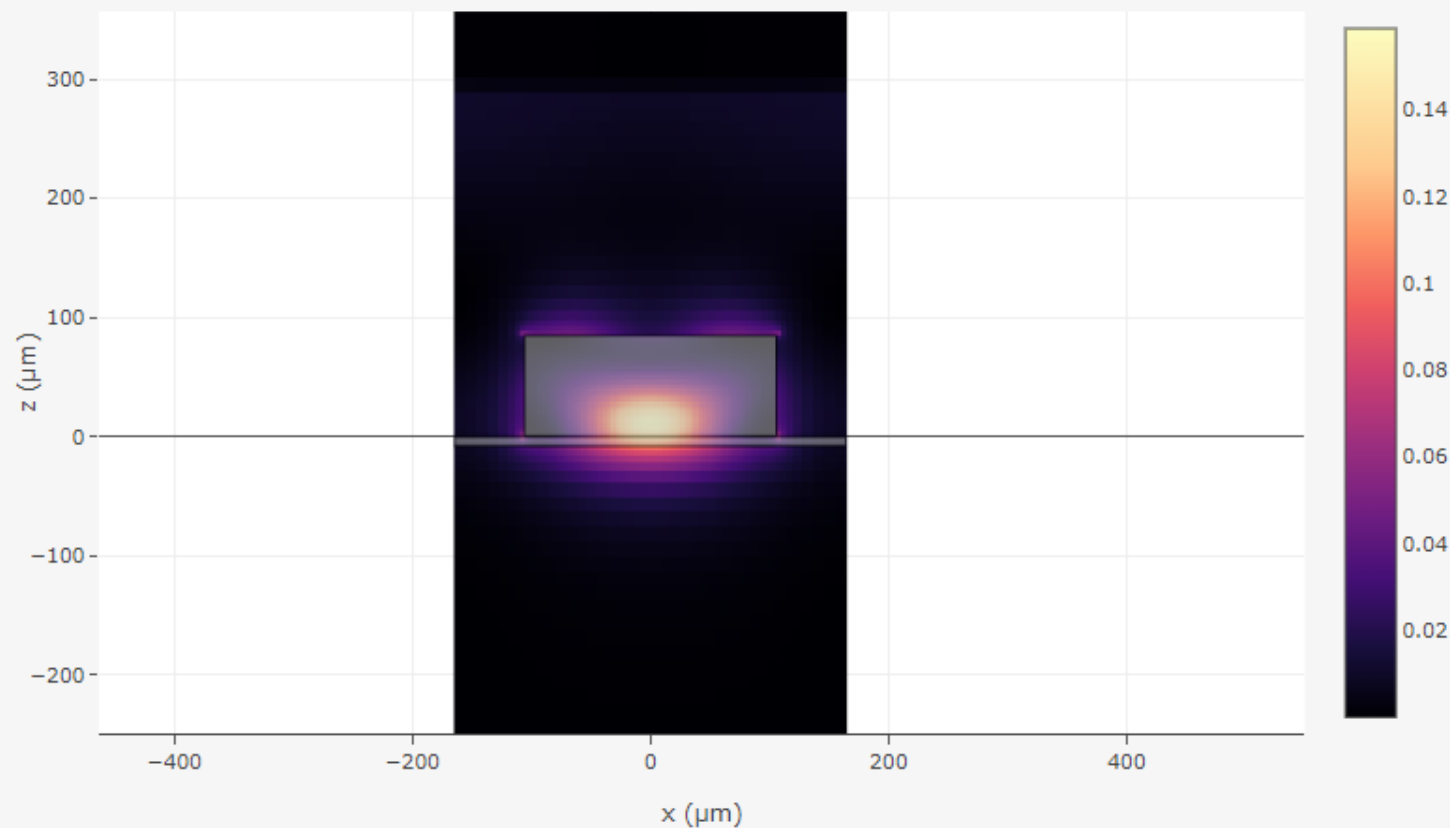
3D Chart

2D Chart

Post-Run Result

Task Details

Edit



Result

Monitor Name

field

Type: FieldMonitor

Field Component

E

Value to Plot

Intensity (abs^2)

Y Position (μm)

0

Frequency Wavelength THz

0.6000000145861187

Use equal axis aspect ratio

Overlay with structure



Simulation Parameter &lt;

STUDIES

FDTD success

Editor

CONFIGURATION

Simulation Domain

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Shutoff Condition

Show More

STRUCTURES

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R

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SCRIPT OBJECTS

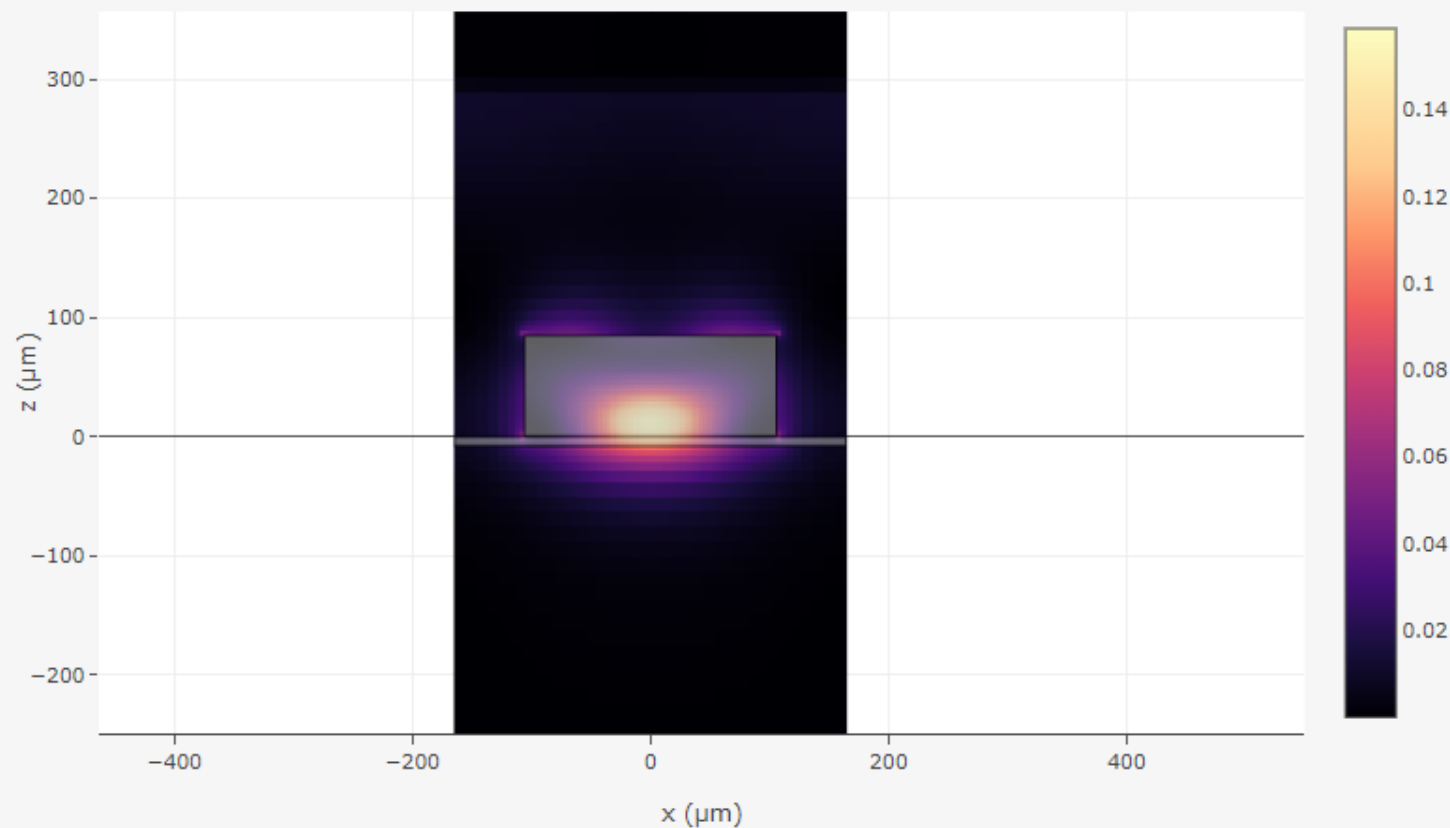
3D Chart

2D Chart

Post-Run Result

Task Details

Edit



Download Data

Result

Monitor Name

field

Type: FieldMonitor

Field Component

E

Value to Plot

Intensity (abs^2)

Y Position (μm)

0

Frequency Wavelength THz

0.6000000145861187

Use equal axis aspect ratio

Overlay with structure



Simulation Parameter

STUDIES

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CONFIGURATION

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- pdms
- cylinder\_resonator Enabled

SOURCES

- plane\_wave

MONITORS

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- R
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SCRIPT OBJECTS

3D Chart

2D Chart

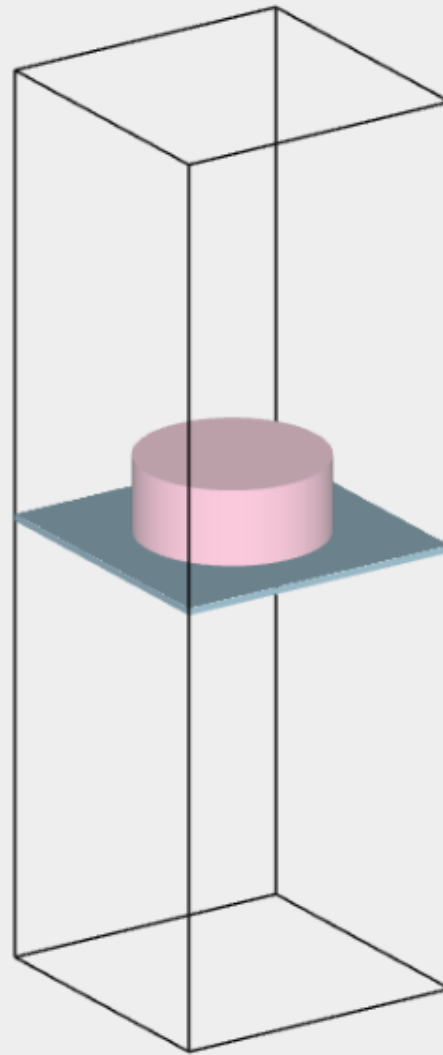
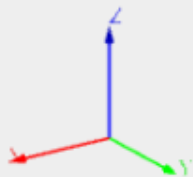
Task Details

Run

Validation pass

Visibility

- Symmetry
- Axes
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- Sources (0/1)
- Monitors (0/3)
- Structures (2/2)
  - pdms
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Simulation Parameter &lt;

STUDIES

FDTD draft

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cylinder\_resonator

box\_resonator

SOURCES

plane\_wave

MONITORS

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R

field

SCRIPT OBJECTS

Edit Structure Help

name

box\_resonator

\* geometry

Box

☒ center + size☐ bounds

center

\* size

X

0

 $\mu\text{m}$ 

X

212

 $\mu\text{m}$ 

Y

0

 $\mu\text{m}$ 

Y

212

 $\mu\text{m}$ 

Z

42.5

 $\mu\text{m}$ 

Z

85

 $\mu\text{m}$ 

\* medium

Si

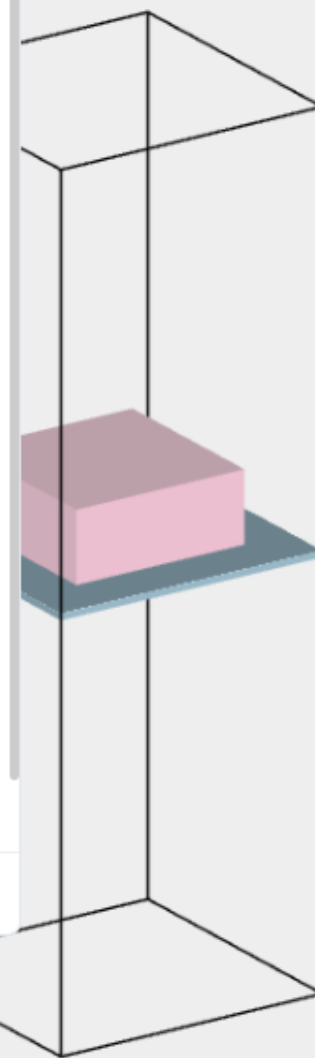
type: Drude

valid for: - Hz

0 - 0  $\mu\text{m}$ 

eps\_inf: 11.7

Apply



Run

Validation pass

Visibility

Symmetry

Axes

Simulation Domain

&gt; Sources(0/1)

&gt; Monitors(0/3)

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pdms

box\_resonator



Simulation Parameter

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- plane\_wave

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- R
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SCRIPT OBJECTS

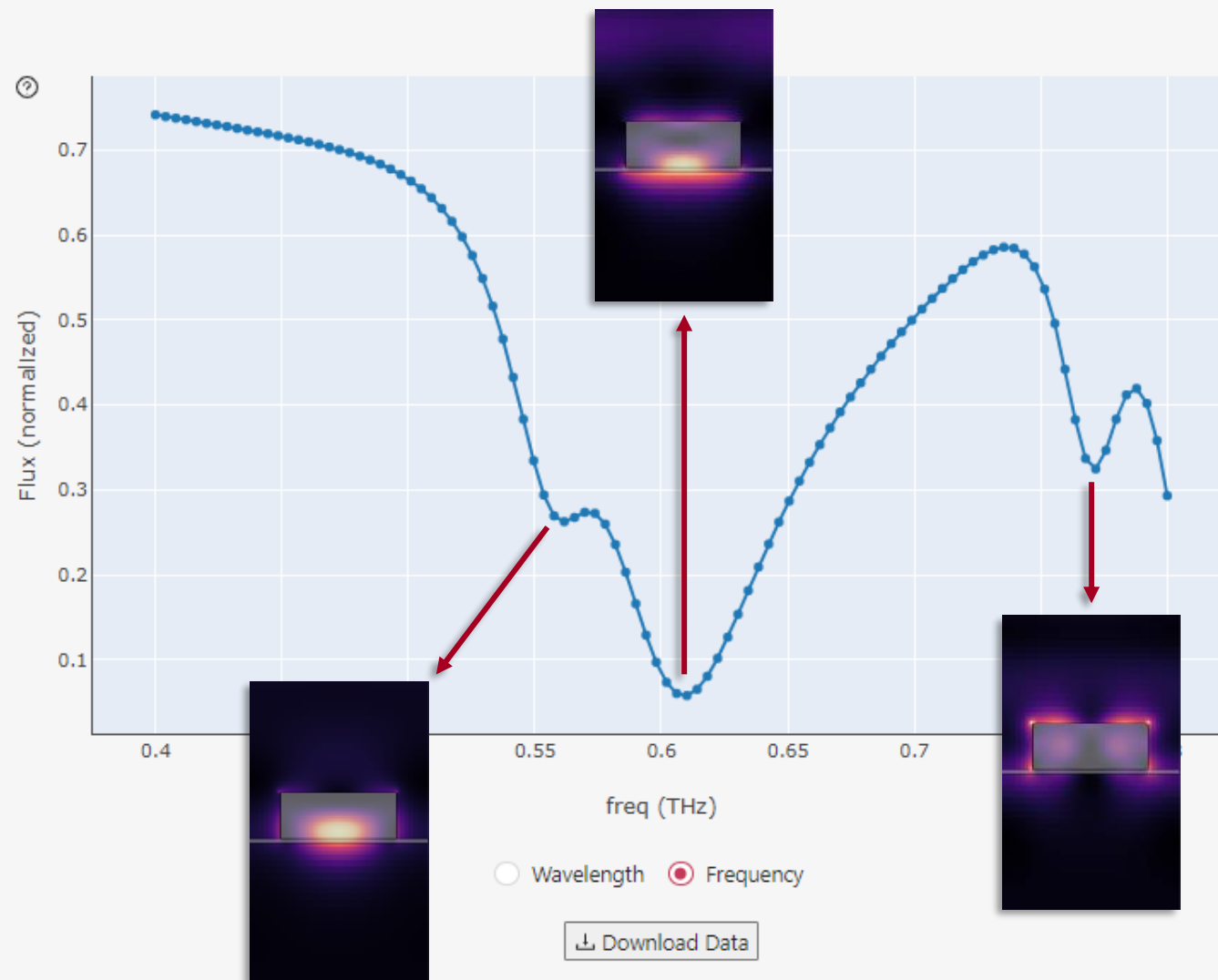
3D Chart

2D Chart

Post-Run Result

Task Details

Edit



Result

Monitor Name

T

Type: FluxMonitor

Operation

Select operation





Simulation Parameter <

STUDIES

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- sphere\_resonator

SOURCES

- plane\_wave

MONITORS

- T
- R
- field

SCRIPT OBJECTS

Edit Structure Help

name

sphere\_resonator

\* geometry

Sphere

\* radius

85  $\mu\text{m}$

center

X 0  $\mu\text{m}$

Y 0  $\mu\text{m}$

Z 85  $\mu\text{m}$

\* medium

Si

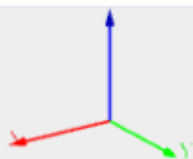
type: Drude

valid for: - Hz

0 - 0  $\mu\text{m}$

eps\_inf: 11.7

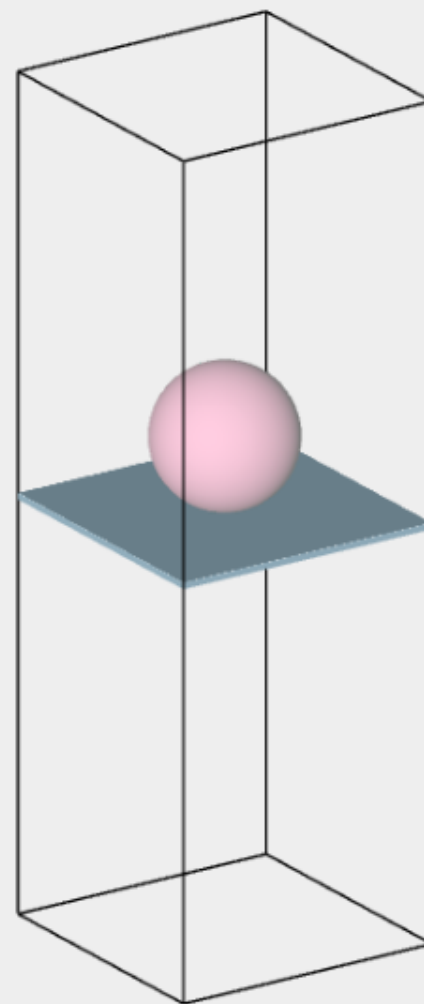
Apply



Task Details

Run

Validation pass



&gt; Visibility

- Symmetry
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- > Monitors(0/3)
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sphere\_resonator

polyslab\_resonator

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R

field

Edit Structure Help

name

polyslab\_resonator

\* geometry

PolySlab

axis

z

\* slab\_bounds

min

0

 $\mu\text{m}$ 

max

85

 $\mu\text{m}$ 

\* vertices

X

106

 $\mu\text{m}$ 

Y

53

 $\mu\text{m}$ 

X

53

 $\mu\text{m}$ 

Y

53

 $\mu\text{m}$ 

X

53

 $\mu\text{m}$ 

Y

106

 $\mu\text{m}$ 

X

-53

 $\mu\text{m}$ 

Y

106

 $\mu\text{m}$ 

X

-53

 $\mu\text{m}$ 

Y

53

 $\mu\text{m}$ 

X

-106

 $\mu\text{m}$ 

Y

53

 $\mu\text{m}$ 

Apply

Task Details

Run

Validation pass

Visibility

Symmetry

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Simulation Domain

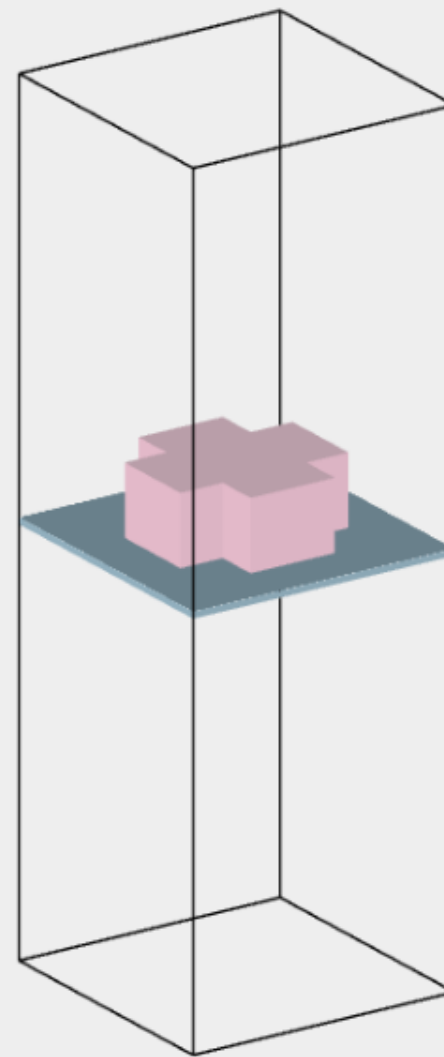
&gt; Sources(0/1)

&gt; Monitors(0/3)

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pdms

polyslab\_resonator



Simulation

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Edit Structure

Help

⌵

✕

\* vertices

a	X	106	μm	Y	53	μm	✕
b	X	53	μm	Y	53	μm	✕
c	X	53	μm	Y	106	μm	✕
d	X	-53	μm	Y	106	μm	✕
e	X	-53	μm	Y	53	μm	✕
f	X	-106	μm	Y	53	μm	✕
g	X	-106	μm	Y	-53	μm	✕
h	X	-53	μm	Y	-53	μm	✕
i	X	-53	μm	Y	-106	μm	✕
j	X	53	μm	Y	-106	μm	✕
k	X	53	μm	Y	-53	μm	✕
l	X	106	μm	Y	-53	μm	✕

+

Add Vertex

Apply

Task Details

Run

Validation pass

Plot Setting

X

Y

Z

0

Visual Thickness of Plane

0.05

Show grid

Show sources

Show monitors

Show structure border

Measure

+

-

↺

?

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box\_resonator

sphere\_resonator

polyslab\_resonator

dimer\_resonator

SOURCES

plane\_wave

MONITORS

T

R

Edit StructureHelp

name

dimer\_resonator

\* geometry

GeometryGroup

geometriesimport from GDS

No Data

Delete All

Add Geometry

\* medium

Si

type: Drude

valid for: - Hz

0 - 0  $\mu$ m

eps\_inf: 11.7

Apply

Task Details

Run

Validation pass

Visibility

Symmetry

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Simulation Domain

Sources0/1

Monitors0/3

Structures1/1

pdms

3D View

+

-

↺

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Edit StructureHelp

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Validation pass

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Sources(1/1)

Monitors(3/3)

Structures(3/3)

pdms

dimer\_resonator(2/2)

name

dimer\_resonator

\* geometry

GeometryGroup

geometries

import

Sphere

Sphere

Add Geometry

\* medium

Si

type: Drude

valid for: - Hz

0 - 0  $\mu\text{m}$

one inf: 11.7

Geometry

\* geometry

Sphere

\* radius

60  $\mu\text{m}$

center

X -61  $\mu\text{m}$

Y 0  $\mu\text{m}$

Z 60  $\mu\text{m}$

Apply

3D View

Apply

Simulation Parameter <

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- sphere\_resonator
- polyslab\_resonator
- dimer\_resonator

SOURCES

- plane\_wave

MONITORS

- T
- R

Edit Structure Help

name

dimer\_resonator

\* geometry

GeometryGroup

geometries import from GDS

Sphere

Sphere

Delete All

Add Geometry

\* medium

Si

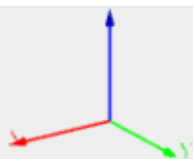
type: Drude

valid for: - Hz

0 - 0  $\mu\text{m}$

one inf: 11.7

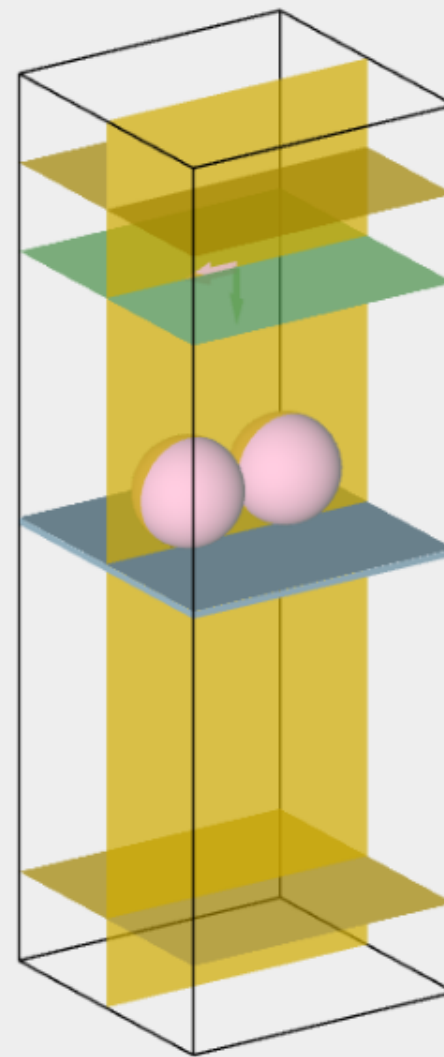
Apply



Task Details

Run

Validation pass



Visibility

- Symmetry
- Axes
- Simulation Domain
- Sources (1/1)
- Monitors (3/3)
- Structures (3/3)
  - pdms
  - dimer\_resonator (2/2)

