ansys-aedt-toolkits-antenna

ANSYS, Inc.
Southpointe
2600 Ansys Drive
Canonsburg, PA 15317
ansysinfo@ansys.com
http://www.ansys.com
(T) 724-746-3304
(F) 724-514-9494

Nov 04, 2024

CONTENTS

Useful links: *Installation* | Source repository | Issues

The AEDT Antenna Toolkit is a Python interface for accelerating antenna design using Ansys Electronics Desktop (AEDT). You can launch this toolkit from AEDT or launch it directly from a Python console.

Getting started Learn more about the AEDT Antenna Toolkit and how to install it.

Getting started Antenna wizard Understand how to use the Antenna toolkit wizard.

Antenna wizard API reference Understand the APIs available for the AEDT Antenna Toolkit.

API reference Examples Explore examples that show how to use the API.

Examples Contribute Learn how to contribute to the AEDT Antenna Toolkit codebase or documentation.

Contribute

CHAPTER

ONE

GETTING STARTED

This section explains how to install the AEDT Antenna Toolkit.

Installation Learn how to install the AEDT Antenna Toolkit.

Installation User guide Learn more about the Antenna wizard and how to use it.

User guide

1.1 Installation

The AEDT Antenna Toolkit can be installed like any other open source package.

You can either install both the backend and user interface (UI) methods or install only the backend methods.

To install both the backend and UI methods, run this command:

```
pip install pyaedt-toolkits-antenna[all]
```

If you only need the common API, install only the backend methods with this command:

```
pip install pyaedt-toolkits-antenna
```

To install the toolkit offline, you can use a wheelhouse. On the Releases page, you can find the wheelhouses for specific release in its asserts and download the wheelhouse.

You can then install the toolkit with this command:

```
pip install --no-cache-dir --no-index --find-links=<path_to_wheelhouse>/ansys-aedt-
↪toolkits-antenna-v0.1.3-wheelhouse-windows-latest-3.10 ansys_aedt_toolkits_antenna
```

You can also install the toolkit using the toolkit manager. For more information, see the toolkit manager (TBD).

1.2 User guide

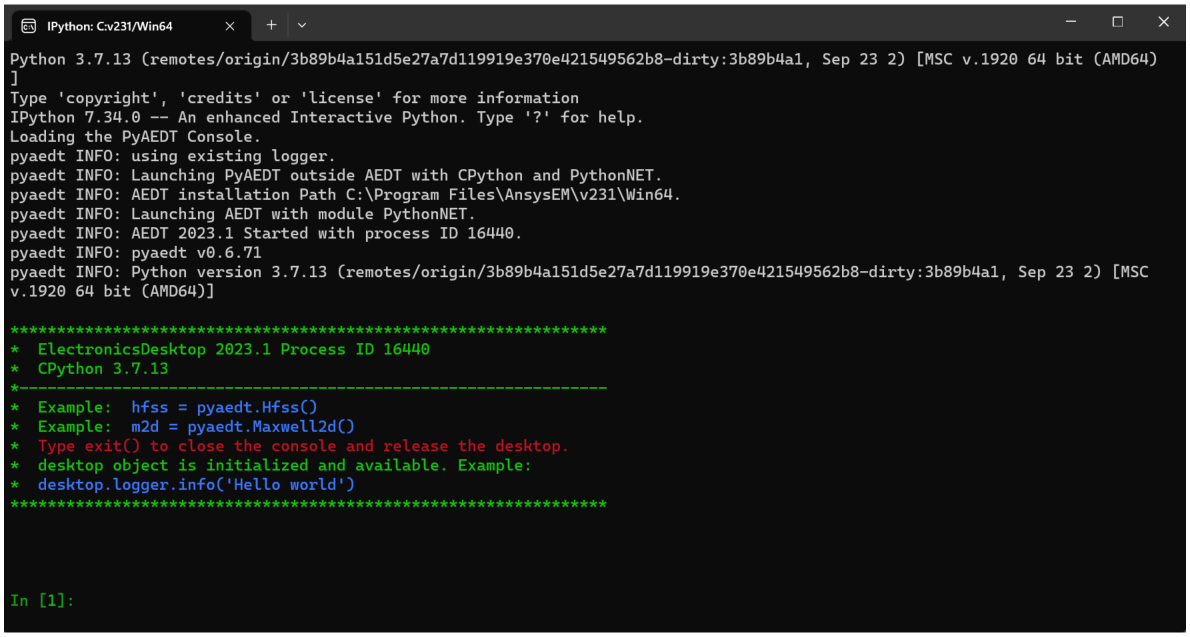
You have multiple options for installing and launching the AEDT Antenna Toolkit:

- You can install the toolkit directly in AEDT using an installation script and then launch it as a wizard. For more information, see *Install toolkit in AEDT and launch the Antenna wizard*.
- You can install the toolkit from a Python console and then launch the Antenna wizard. For more information, see *Install toolkit from Python console and launch the Antenna wizard*.
- You can install the toolkit from a Python console and then use the toolkits APIs. For more information, see *Install toolkit from Python console and use the toolkits APIs*.

1.2.1 Install toolkit in AEDT and launch the Antenna wizard

You can install the AEDT Antenna Toolkit directly in AEDT using the base interpreter from the AEDT installation.

1. From Install from a Python file, follow the steps to install PyAEDT inside AEDT.
2. In AEDT, select **Tools > Toolkit > PyAEDT > Console** to load the PyAEDT console:

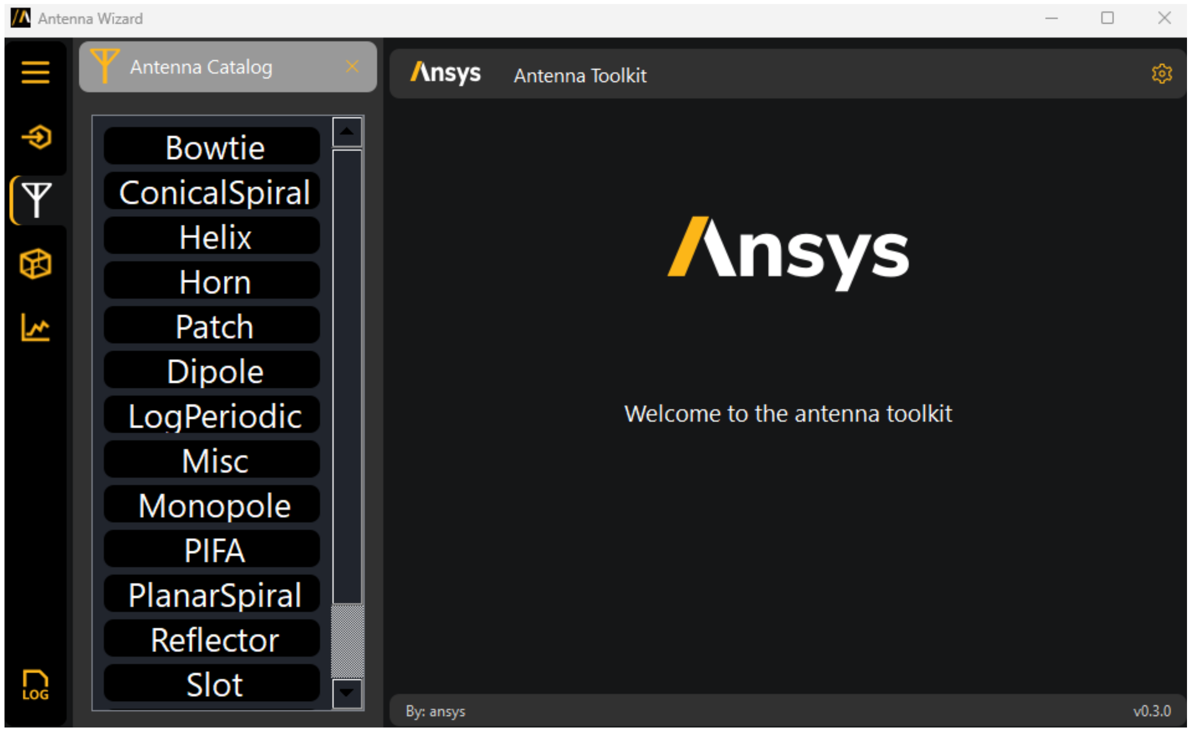


```
Python 3.7.13 (remotes/origin/3b89b4a151d5e27a7d119919e370e421549562b8-dirty:3b89b4a1, Sep 23 2) [MSC v.1920 64 bit (AMD64)
]
Type 'copyright', 'credits' or 'license' for more information
IPython 7.34.0 -- An enhanced Interactive Python. Type '?' for help.
Loading the PyAEDT Console.
pyaedt INFO: using existing logger.
pyaedt INFO: Launching PyAEDT outside AEDT with CPython and PythonNET.
pyaedt INFO: AEDT installation Path C:\Program Files\AnsysEM\v231\Win64.
pyaedt INFO: Launching AEDT with module PythonNET.
pyaedt INFO: AEDT 2023.1 Started with process ID 16440.
pyaedt INFO: pyaedt v0.6.71
pyaedt INFO: Python version 3.7.13 (remotes/origin/3b89b4a151d5e27a7d119919e370e421549562b8-dirty:3b89b4a1, Sep 23 2) [MSC
v.1920 64 bit (AMD64)]

*****************************************************************
*  ElectronicsDesktop 2023.1 Process ID 16440
*  CPython 3.7.13
*----------------------------------------------------------------
*  Example:  hfss = pyaedt.Hfss()
*  Example:  m2d = pyaedt.Maxwell2d()
*  Type exit() to close the console and release the desktop.
*  desktop object is initialized and available. Example:
*  desktop.logger.info('Hello world')
*****************************************************************



In [1]:
```

3. In the PyAEDT console, run these commands to add the Antenna Toolkit as a wizard (toolkit UI) in AEDT:

```
desktop.add_custom_toolkit("AntennaWizard")
exit()
```

4. In the AEDT toolbar, click the **AntennaWizard** button to open this wizard in AEDT:



The Antenna Toolkit Wizard is connected directly to the AEDT session. For wizard usage information, see *Antenna wizard*.

1.2.2 Install toolkit from Python console and launch the Antenna wizard

You can install the AEDT Antenna Toolkit in a specific Python environment from the AEDT console.

Note

If you have an existing virtual environment, skip step 1.

Note

If you have already installed the toolkit in your virtual environment, skip step 2.

1. Create a fresh-clean Python environment and activate it:

```
# Create a virtual environment
python -m venv .venv

# Activate it in a POSIX system
source .venv/bin/activate

# Activate it in a Windows CMD environment
.venv\Scripts\activate.bat

# Activate it in Windows PowerShell
.venv\Scripts\Activate.ps1
```

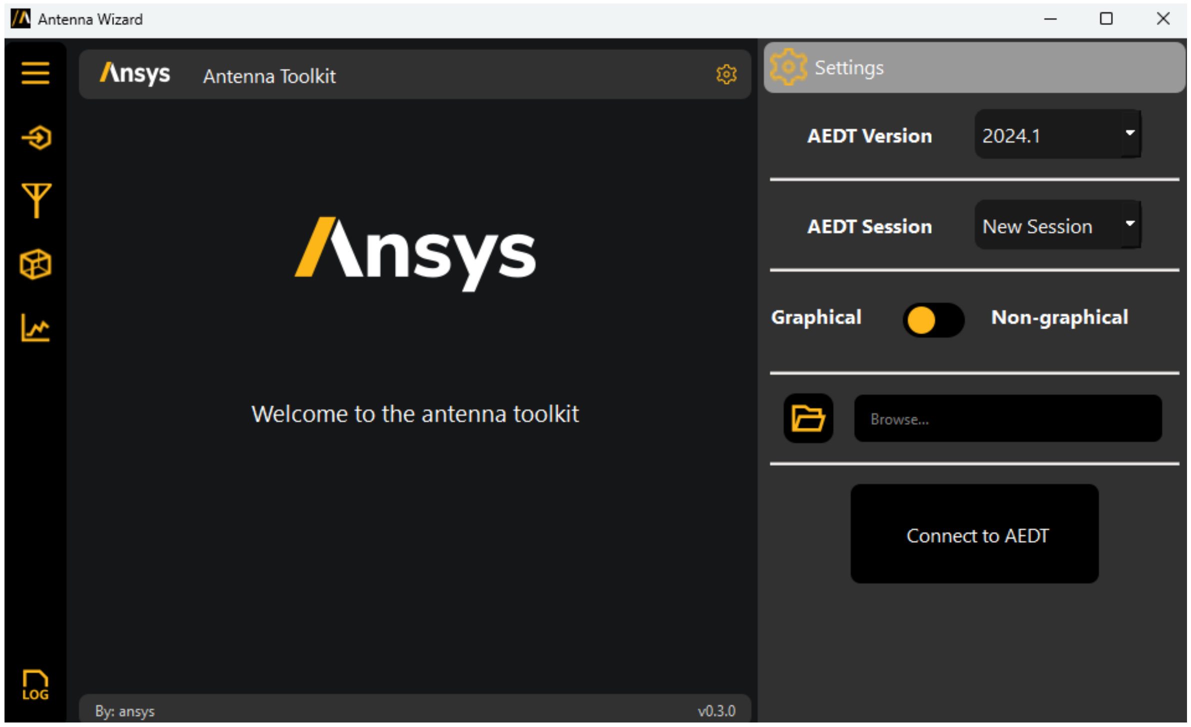
2. Install the toolkit from the GitHub repository:

```
python -m pip install pyaedt-toolkits-antenna[all]
```

3. Launch the Antenna Toolkit Wizard:

```
python .venv\Lib\site-packages\ansys\aedt\toolkits\antenna\run_toolkit.py
```

4. On the **AEDT Settings** tab, create an AEDT session or connect to an existing one:



For wizard usage information, see *Antenna wizard*.

1.2.3 Install toolkit from Python console and use the toolkits APIs

You can install the toolkit in a specific Python environment and use the toolkits APIs. The code example included in this topic shows how to use the APIs at the model level and toolkit level.

Note

If you have an existing virtual environment, skip step 1.

Note

If you have already installed the toolkit in your virtual environment, skip step 2.

1. Create a fresh-clean Python environment and activate it:

```
# Create a virtual environment
python -m venv .venv
```

(continues on next page)

(continued from previous page)

```
# Activate it in a POSIX system
source .venv/bin/activate

# Activate it in a Windows CMD environment
.venv\Scripts\activate.bat

# Activate it in Windows PowerShell
.venv\Scripts\Activate.ps1
```

2. Install the toolkit from the GitHub repository:

```
python -m pip install pyaedt-toolkits-antenna
```

3. Open a Python console in your virtual environment:

```
python
```

4. From the command line, use the toolkit to create an antenna.

   This code shows how to launch AEDT, create and synthesize a bowtie antenna, and run a simulation in HFSS:

```
# Import required modules
from ansys.aedt.core import Hfss
from ansys.aedt.toolkits.antenna.backend.antenna_models.bowtie import BowTie

# Open AEDT and create an HFSS design
aedtapp = Hfss()

# Create antenna object
oantenna1 = BowTie(aedtapp)

# Change frequency
oantenna1.frequency = 12.0

# Create antenna in HFSS
oantenna1.model_hfss()

# Create setup in HFSS
oantenna1.setup_hfss()

# Release AEDT
aedtapp.release_desktop()
```

5. To create an antenna from the toolkit level, use the `Toolkit` class.

   This code shows how to use the `Toolkit` class to get available antennas and their properties, open AEDT, update antenna properties, and create a bowtie antenna:

```
# Import required modules
import time
from ansys.aedt.toolkits.antenna.backend.api import ToolkitBackend

# Backend object
```

(continues on next page)

(continued from previous page)

```python
toolkit = ToolkitBackend()

# Get available antennas
toolkit.available_antennas

# Get properties
properties = toolkit.get_properties()

# Set properties
properties = toolkit.set_properties({"length_unit": "cm"})

# Launch AEDT in a thread
toolkit.launch_aedt()

# Wait until thread is finished
idle = toolkit.wait_to_be_idle()

# Update antenna properties
response = toolkit.set_properties({"substrate_height": 0.1575, "length_unit": "cm"})

# Create a bowtie antenna
toolkit.get_antenna("BowTie")

# Release AEDT
toolkit.release_aedt()
```

CHAPTER

TWO

ANTENNA WIZARD

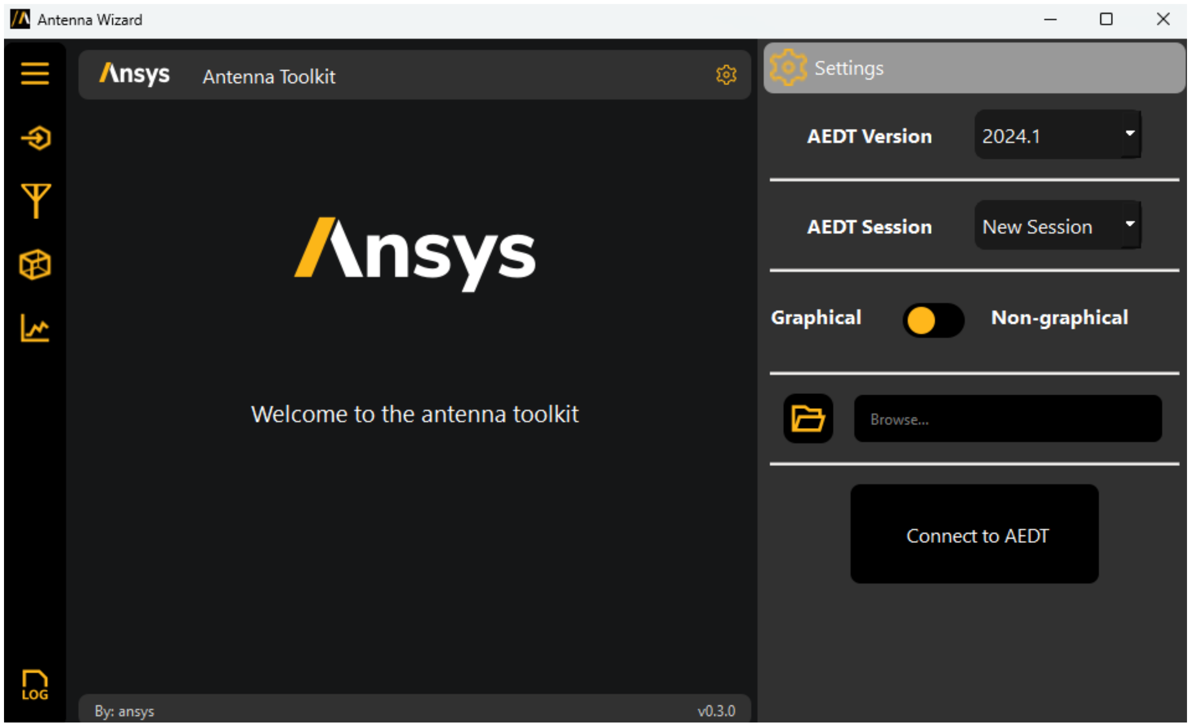
This section describes how to use the Antenna wizard. It assumes that you have already launched the wizard from either the AEDT menu or AEDT console. For toolkit installation and wizard launching information, see these topics:

- *Install toolkit in AEDT and launch the Antenna wizard*
- *Install toolkit from Python console and launch the Antenna wizard*

1. On the **Settings** tab, specify settings for either creating an AEDT session or connecting to an existing AEDT session.

   Note

   If the Antenna Toolkit Wizard is launched from AEDT, the **Settings** tab does not appear because the toolkit is directly connected to the specific AEDT session.

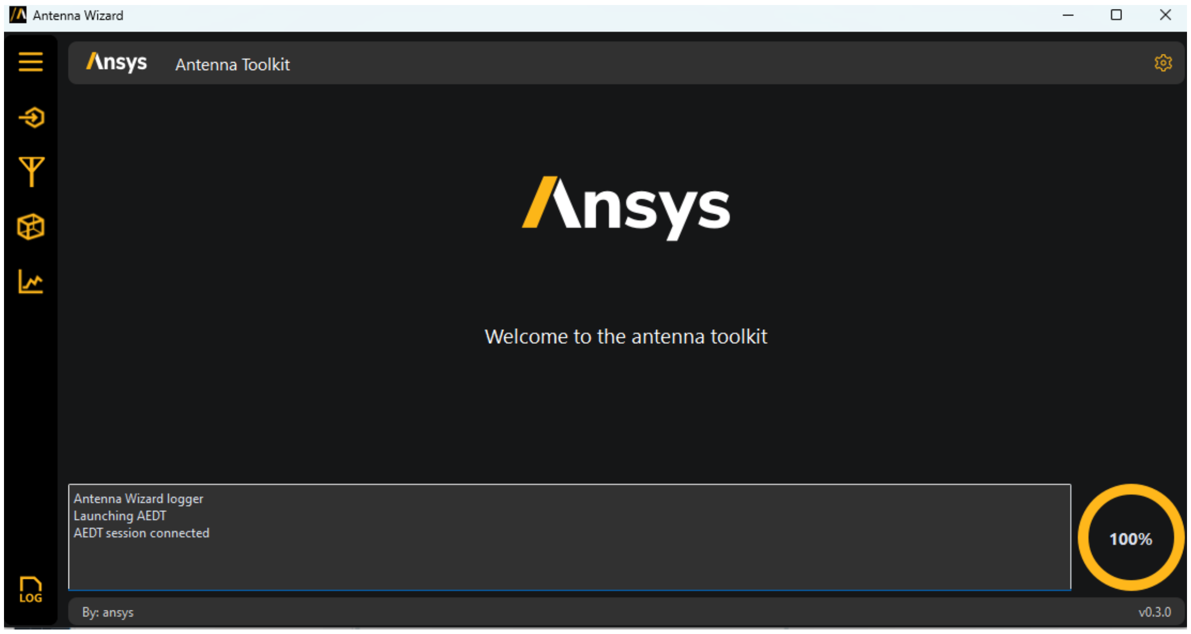


AEDT Version 2024.1

AEDT Session New Session

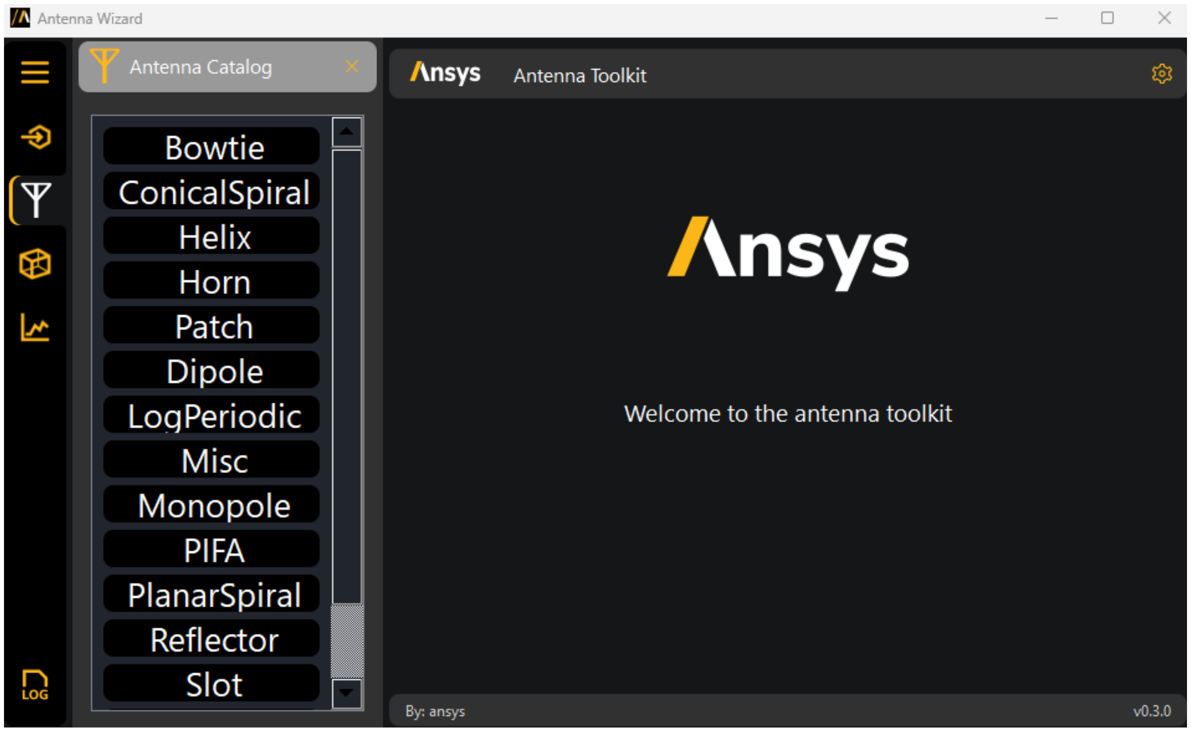
Graphical Non-graphical

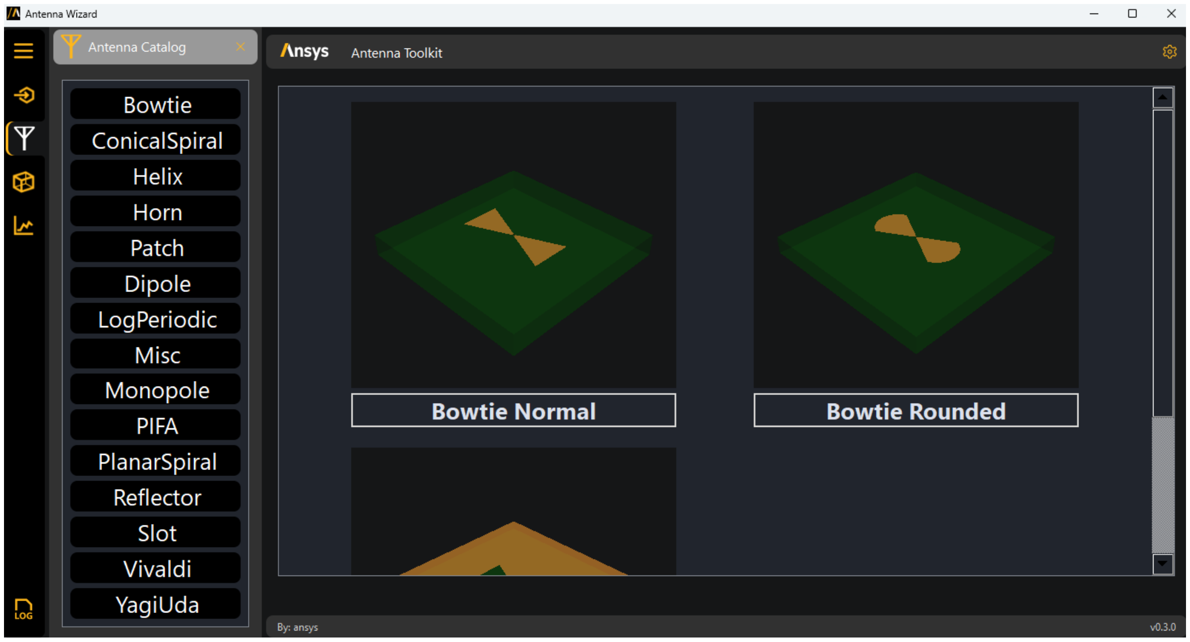
The wizard has a progress circle and a logger box, where you can see the status of every operation.



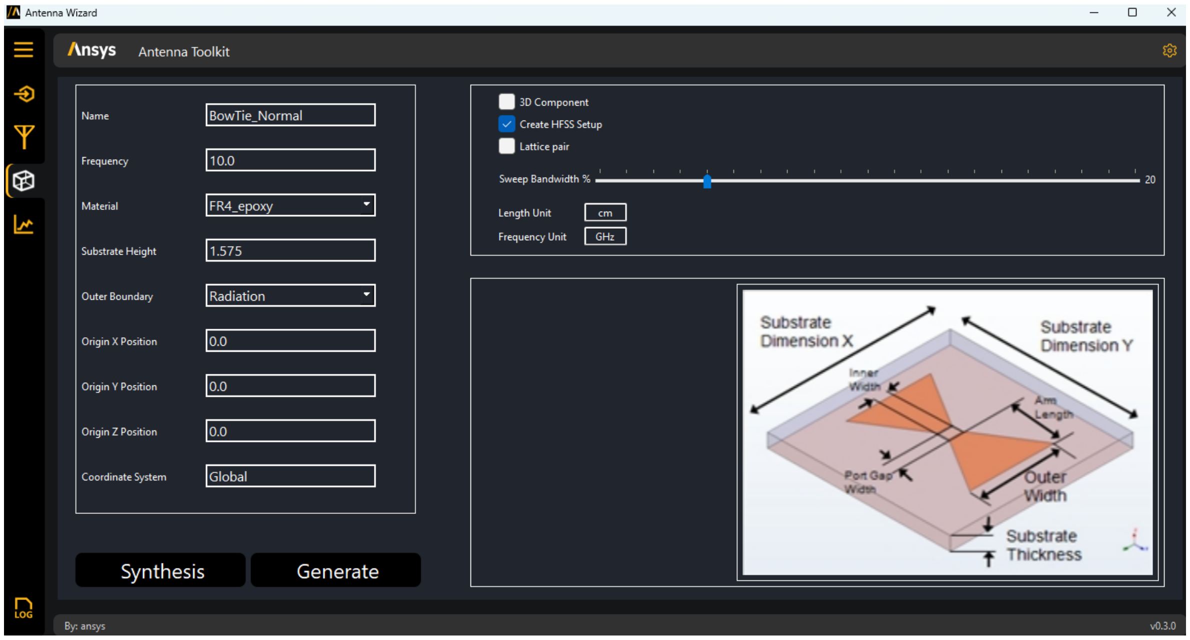
```
Antenna Wizard logger
Launching AEDT
AEDT session connected
```

You can choose different antennas from the **Antenna catalog** menu to load the antennas template.





For example, if you select **Antennas > Bowtie > Bowtie Normal**, the central page is updated to the **Synthesis** page and it shows the antenna template:



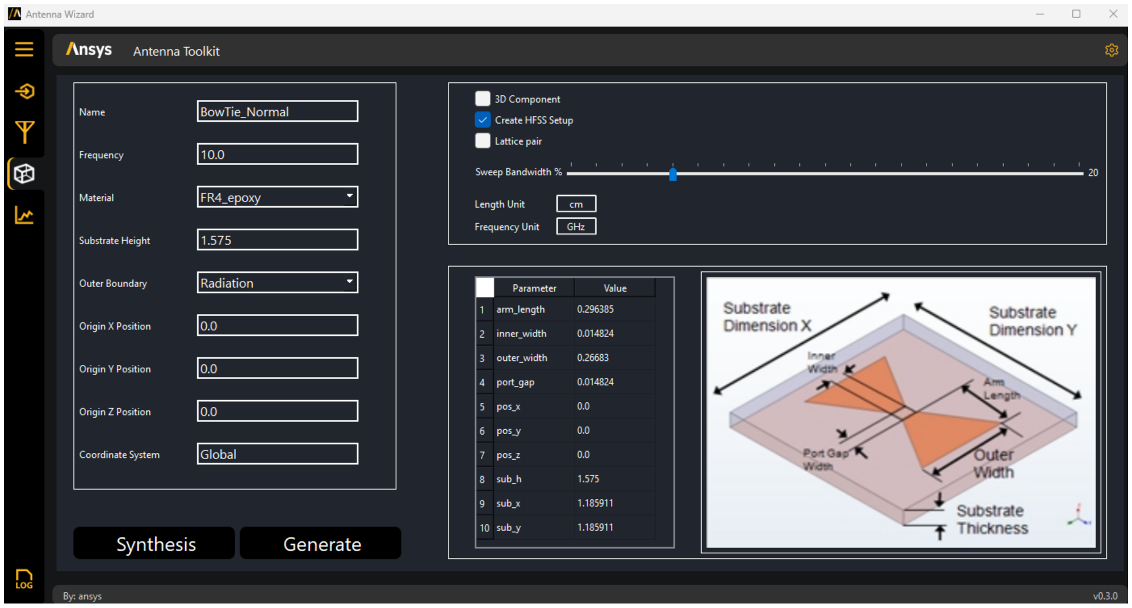
Name	BowTie_Normal
Frequency	10.0
Material	FR4_epoxy
Substrate Height	1.575
Outer Boundary	Radiation
Origin X Position	0.0
Origin Y Position	0.0
Origin Z Position	0.0
Coordinate System	Global

3D Component
[✓ Create HFSS Setup]
Lattice pair
Sweep Bandwidth % 20
Length Unit cm
Frequency Unit GHz

You have two options: **Synthesis** and **Generate**. The **Generate** button is unavailable if the wizard is not connected to AEDT.

- The **Synthesis** button is for performing the synthesis of the antenna. A connection to AEDT

is not needed.
You can see the parameters that control the antenna geometry. Additionally, you can do as many syntheses as you want and even change the antenna template.



Name	BowTie_Normal
Frequency	10.0
Material	FR4_epoxy
Substrate Height	1.575
Outer Boundary	Radiation
Origin X Position	0.0
Origin Y Position	0.0
Origin Z Position	0.0
Coordinate System	Global

[ ] 3D Component
[✓] Create HFSS Setup
[ ] Lattice pair
Sweep Bandwidth % 20
Length Unit cm
Frequency Unit GHz

	Parameter	Value
1	arm_length	0.296385
2	inner_width	0.014824
3	outer_width	0.26683
4	port_gap	0.014824
5	pos_x	0.0
6	pos_y	0.0
7	pos_z	0.0
8	sub_h	1.575
9	sub_x	1.185911
10	sub_y	1.185911

- The **Generate** button is for creating an HFSS model. It uses the **3D Component**, **Create Hfss Setup**, and **Lattice pair** checkboxes along with the **Sweep Bandwidth %** option It also uses the length and frequency unit to perform the HFSS setup.

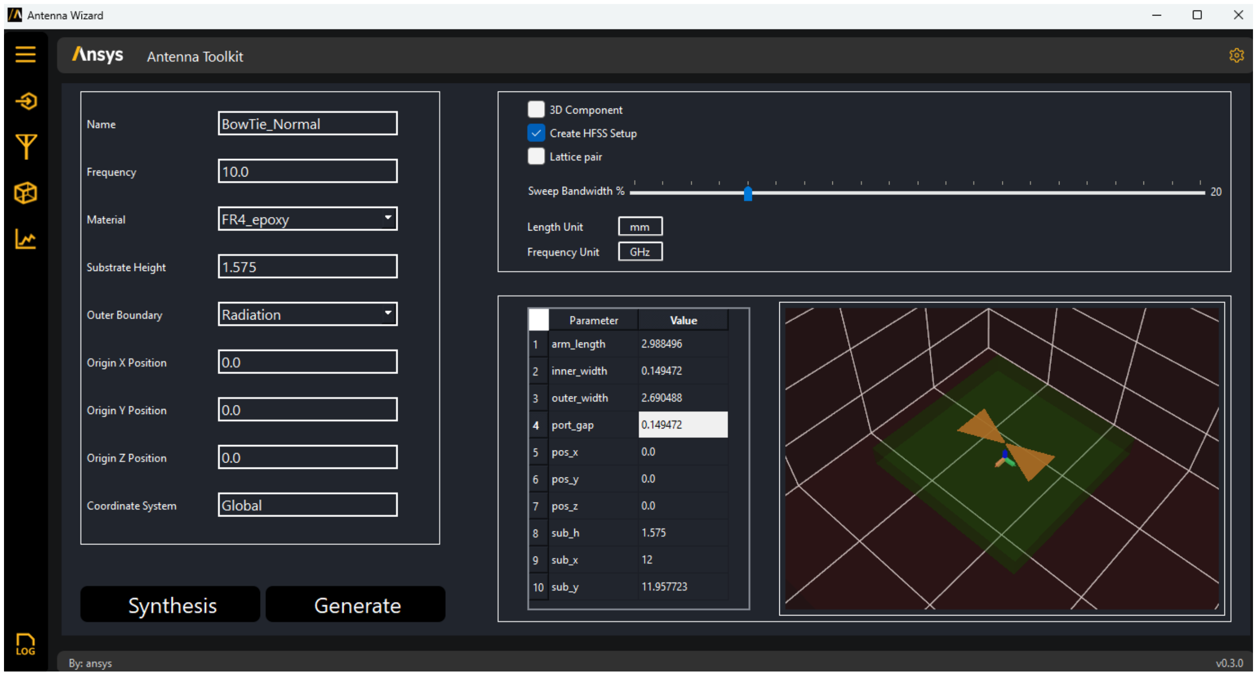
  Descriptions follow for how to use the checkboxes on the **Design** tab:

  – If you select the **3D Component** checkbox, the toolkit creates the antenna and replaces it with a 3D component.

  – If you select the **Generate** checkbox, the toolkit automatically creates the boundaries, excitations, and ports needed to simulate the antenna. Once you create an HFSS model, you cannot create another antenna. Both the **Synthesis** and **Generate** buttons become unavailable. If you want to create another antenna, you must restart the toolkit.

  – If you select the **Lattice pair** checkbox, the toolkit creates a unit cell assigning a lattice pair boundary.

Once you create an antenna, the **Synthesis** tab displays an interactive 3D model rather than the image of the antenna template:



Name	BowTie_Normal
Frequency	10.0
Material	FR4_epoxy
Substrate Height	1.575
Outer Boundary	Radiation
Origin X Position	0.0
Origin Y Position	0.0
Origin Z Position	0.0
Coordinate System	Global

- [ ] 3D Component
- [x] Create HFSS Setup
- [ ] Lattice pair

Sweep Bandwidth % 20

Length Unit mm

Frequency Unit GHz

	Parameter	Value
1	arm_length	2.988496
2	inner_width	0.149472
3	outer_width	2.690488
4	port_gap	0.149472
5	pos_x	0.0
6	pos_y	0.0
7	pos_z	0.0
8	sub_h	1.575
9	sub_x	12
10	sub_y	11.957723

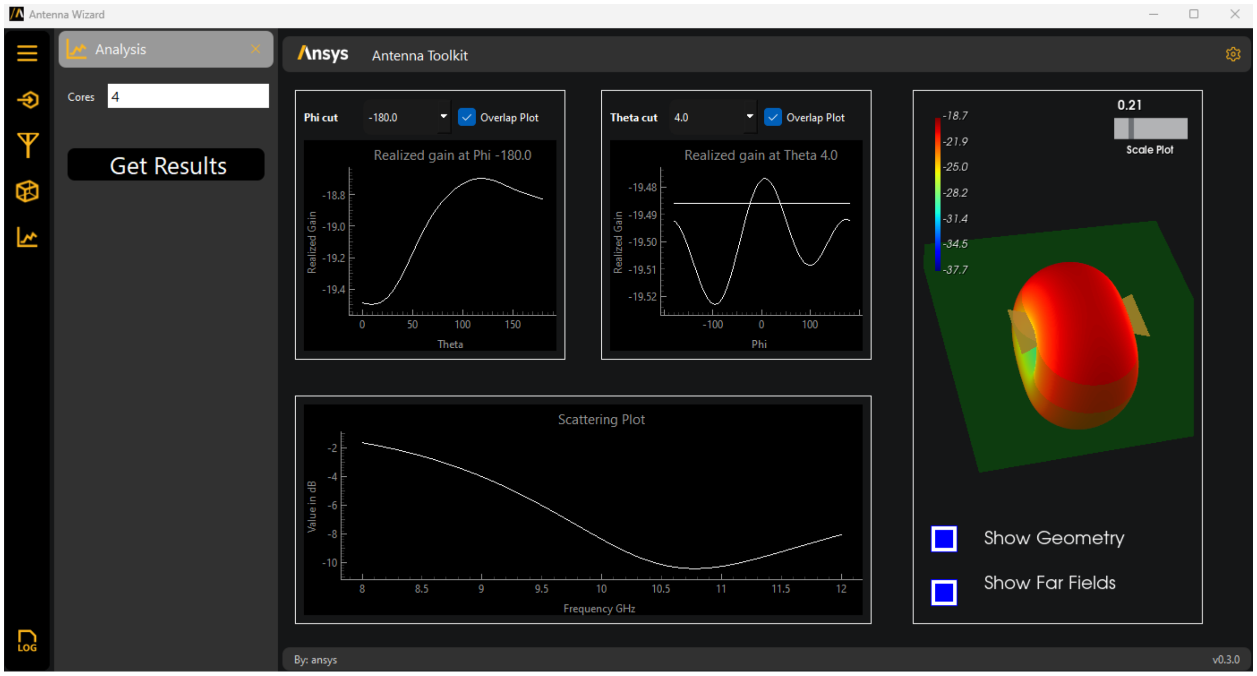
If AEDT is launched in non-graphical mode, you can still see the generated model.

In the wizard, you can modify the parameters interactively, watching both the HFSS model and the interactive 3D plot in the wizard change.

Finally, on the wizards **Analysis** tab, you have the **Get results** button. This second button is unavailable until after you analyze the HFSS design.

When you click **Get results**, the project is analyzed. You can specify the number of cores to use in the simulation.

Once the project is solved, you can click **Get results** on the **Analysis** tab to view results.



Cores 4

Phi cut -180.0 [✓ Overlap Plot]

Theta cut 4.0 [✓ Overlap Plot]

0.21

Show Geometry

Show Far Fields

CHAPTER

THREE

API REFERENCE

This section provides descriptions of the two APIs available for the AEDT Antenna Toolkit:

- **Toolkit API**: Contains the `Toolkit` class, which provides methods for controlling the toolkit workflow. This API provides methods for synthesizing and creating an antenna. You use the Toolkit API at the toolkit level.
- **Antenna API**: Contains classes for all antenna types available in the toolkit. You use the Antenna API at the model level.

3.1 Toolkit API

The Toolkit API contains the `Toolkit` class, which provides methods for controlling the toolkit workflow. This API provides methods for synthesizing and creating an antenna. You use the Toolkit API at the toolkit level.

The common methods for creating an AEDT session or connecting to an existing AEDT session are provided by the Common PyAEDT toolkit library.

ToolkitBackend()	Provides methods for controlling the toolkit workflow.

3.1.1 ansys.aedt.toolkits.antenna.backend.api.ToolkitBackend

class ansys.aedt.toolkits.antenna.backend.api.**ToolkitBackend**

Provides methods for controlling the toolkit workflow.

This class provides methods for creating an AEDT session, connecting to an existing AEDT session, and synthesizing and creating an antenna in HFSS.

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.api import ToolkitBackend
>>> import time
>>> toolkit = ToolkitBackend()
>>> msg1 = toolkit.launch_aedt()
>>> toolkit.wait_to_be_idle()
>>> toolkit.get_antenna("BowTie")
```

__init__()

Methods

`__init__()`	
`aedt_sessions()`	Get information for the active AEDT sessions.
`analyze()`	Analyze the design.
`connect_aedt()`	Connect to an existing AEDT session.
`connect_design([app_name])`	Connect to an application design.
`export_aedt_model([obj_list, export_path, ...])`	Export the model in the OBJ format and then encode the file if the `encode` parameter is enabled.
`export_farfield([frequencies, setup, ...])`	Export far field data and then encode the file if the `encode` parameter is enabled.
`get_antenna(antenna[, synth_only])`	Synthesize and create an antenna in HFSS.
`get_design_names()`	Get the design names for a specific project.
`get_project_name(project_path)`	Get the project name from the project path.
`get_properties()`	Get the toolkit properties.
`get_thread_status()`	Get the toolkit thread status.
`installed_aedt_version()`	Get the installed AEDT versions.
`is_aedt_connected()`	Check if AEDT is connected.
`launch_aedt()`	Launch AEDT.
`launch_thread(process)`	Launch the thread.
`open_project([project_name])`	Open an AEDT project.
`release_aedt([close_projects, close_on_exit])`	Release AEDT.
`save_project([project_path, release_aedt])`	Save the project.
`scattering_results()`	Get antenna scattering results.
`serialize_obj_base64(file_path)`	Encode a bytes-like object.
`set_properties(data)`	Assign the passed data to the internal data model.
`update_hfss_parameters(key, val)`	Update parameters in HFSS.
`wait_to_be_idle([timeout])`	Wait for the thread to be idle and ready to accept a new task.

You can use the Toolkit API as shown in this example:

```python
# Import required modules for the example
import time

# Import backend
from ansys.aedt.toolkits.template.backend.api import ToolkitBackend

# Initialize generic service
toolkit_api = Toolkit()

# Load default properties from a JSON file
properties = toolkit_api.get_properties()

# Set properties
new_properties = {"aedt_version": "2023.1"}
toolkit_api.set_properties(new_properties)
properties = toolkit_api.get_properties()

# Launch AEDT
thread_msg = toolkit_api.launch_thread(toolkit_api.launch_aedt)
```

(continues on next page)

(continued from previous page)

```python
# Wait until thread is finished
idle = toolkit_api.wait_to_be_idle()
if not idle:
    print("AEDT not initialized.")
    sys.exit()

# Create geometry
toolkit_api.connect_design("HFSS")

# Create setup when antenna is created
properties.antenna.setup.create_setup = True
properties.antenna.synthesis.outer_boundary = "Radiation"

# Generate antenna
antenna_parameter = toolkit_api.get_antenna("RectangularPatchProbe")

# Release AEDT
toolkit_api.release_aedt()
```

3.2 Antenna API

The Antenna API contains classes for all antenna types available in the toolkit:

3.2.1 Bowtie

This page list the classes available for bowtie antennas:

BowTieNormal(*args, **kwargs)	Manages a bowtie antenna.
BowTieRounded(*args, **kwargs)	Manages a bowtie rounded antenna.
BowTieSlot(*args, **kwargs)	Manages a bowtie slot antenna.

ansys.aedt.toolkits.antenna.backend.antenna_models.bowtie.BowTieNormal

`class ansys.aedt.toolkits.antenna.backend.antenna_models.bowtie.`**`BowTieNormal`**`(`*`*args, **kwargs`*`)`

Manages a bowtie antenna.

This class is accessible through the `Hfss` object [**?**].

Parameters

frequency
[`float`, `optional`] Center frequency. The default is `10.0`.

frequency_unit
[`str`, `optional`] Frequency units. The default is `"GHz"`.

material
[`str`, `optional`] Substrate material. If a material is not defined, a new material, `parametrized`, is defined. The default is `"FR4_epoxy"`.

outer_boundary
[str, optional] Boundary type to use. The default is None. Options are "FEBI", "PML", "Radiation", and None.

length_unit
[str, optional] Length units. The default is "mm".

substrate_height
[float, optional] Substrate height. The default is 1.575.

parametrized
[bool, optional] Whether to create a parametrized antenna. The default is True.

Returns

aedt.toolkits.antenna.BowTie
Bowtie antenna object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.bowtie import␣
↪BowTieNormal
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = BowTieNormal(app)
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> oantenna2 = BowTieNormal(app, origin=[200, 50, 0])
>>> oantenna2.model_hfss()
>>> oantenna2.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

__init__(*args, **kwargs)	
create_3dcomponent([component_file, ...])	Create a 3D component of the antenna.
create_lattice_pair([lattice_height, ...])	Create a lattice pair box.
duplicate_along_line(vector[, num_clones])	Duplicate the object along a line.
init_model()	Create a radiation boundary.
model_disco()	Model the bowtie antenna in PyDiscovery.
model_hfss()	Draw a bowtie antenna.
set_variables_in_hfss([not_used])	Create HFSS design variables.
setup_disco()	Set up the model in PyDiscovery.
setup_hfss()	Set up an antenna in HFSS.
synthesis()	Antenna synthesis.
update_synthesis_parameters(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Substrate material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.
`substrate_height`	Substrate height.

ansys.aedt.toolkits.antenna.backend.antenna_models.bowtie.BowTieRounded

class `ansys.aedt.toolkits.antenna.backend.antenna_models.bowtie.`**`BowTieRounded`**`(`**args*, ***kwargs*`)`

Manages a bowtie rounded antenna.

This class is accessible through the `Hfss` object [**?**].

Parameters

frequency
[`float`, `optional`] Center frequency. The default is `10.0`.

frequency_unit
[`str`, `optional`] Frequency units. The default is `"GHz"`.

material
[`str`, `optional`] Substrate material. If a material is not defined, a new material, `parametrized`, is defined. The default is `"FR4_epoxy"`.

outer_boundary
[`str`, `optional`] Boundary type to use. The default is `None`. Options are `"FEBI"`, `"PML"`, `"Radiation"`, and `None`.

length_unit
[`str`, `optional`] Length units. The default is `"mm"`.

substrate_height
[`float`, `optional`] Substrate height. The default is `1.575`.

parametrized
[bool, `optional`] Whether to create a parametrized antenna. The default is `True`.

Returns

`aedt.toolkits.antenna.BowTieRounded`
Patch antenna object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.bowtie import␣
↪BowTieRounded
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = BowTieRounded(app)
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> oantenna2 = BowTieRounded(app, origin=[200, 50, 0])
>>> oantenna2.model_hfss()
>>> oantenna2.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

`__init__`(*args, **kwargs)	
`create_3dcomponent`([component_file, ...])	Create a 3D component of the antenna.
`create_lattice_pair`([lattice_height, ...])	Create a lattice pair box.
`duplicate_along_line`(vector[, num_clones])	Duplicate the object along a line.
`init_model`()	Create a radiation boundary.
`model_disco`()	Model in PyDiscovery.
`model_hfss`()	Draw a bowtie rounded antenna.
`set_variables_in_hfss`([not_used])	Create HFSS design variables.
`setup_disco`()	Set up the model in PyDiscovery.
`setup_hfss`()	Set up an antenna in HFSS.
`synthesis`()	Antenna synthesis.
`update_synthesis_parameters`(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Substrate material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.
`substrate_height`	Substrate height.

ansys.aedt.toolkits.antenna.backend.antenna_models.bowtie.BowTieSlot

class ansys.aedt.toolkits.antenna.backend.antenna_models.bowtie.**BowTieSlot**(**args*, ***kwargs*)

Manages a bowtie slot antenna.

This class is accessible through the `Hfss` object [**?**].

Parameters

frequency
[float, optional] Center frequency. The default is `10.0`.

frequency_unit
[str, optional] Frequency units. The default is `"GHz"`.

material
[str, optional] Substrate material. If a material is not defined, a new material, `parametrized`, is defined. The default is `"FR4_epoxy"`.

outer_boundary
[str, optional] Boundary type to use. The default is `None`. Options are `"FEBI"`, `"PML"`, `"Radiation"`, and `None`.

length_unit
[str, optional] Length units. The default is `"mm"`.

substrate_height
[float, optional] Substrate height. The default is `0.1575`.

parametrized
[bool, optional] Whether to create a parametrized antenna. The default is `True`.

Returns

aedt.toolkits.antenna.BowTieSlot
Bowtie antenna object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.bowtie import BowTieSlot
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = BowTieSlot(app)
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> oantenna2 = BowTieSlot(app, origin=[200, 50, 0])
>>> oantenna2.model_hfss()
>>> oantenna2.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

`__init__`(*args, **kwargs)	
`create_3dcomponent`([component_file, ...])	Create a 3D component of the antenna.
`create_lattice_pair`([lattice_height, ...])	Create a lattice pair box.
`duplicate_along_line`(vector[, num_clones])	Duplicate the object along a line.
`init_model`()	Create a radiation boundary.
`model_disco`()	Model in PyDiscovery.
`model_hfss`()	Draw a bowtie slot antenna.
`set_variables_in_hfss`([not_used])	Create HFSS design variables.
`setup_disco`()	Set up the model in PyDiscovery.
`setup_hfss`()	Set up an antenna in HFSS.
`synthesis`()	Antenna synthesis.
`update_synthesis_parameters`(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Substrate material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.
`substrate_height`	Substrate height.

You must use these methods from PyAEDT as shown in this example:

```python
from ansys.aedt.core import Hfss

from ansys.aedt.toolkits.antenna.backend.antenna_models.bowtie import BowTieNormal

aedtapp = Hfss()

# Create antenna
oantenna1 = BowTieNormal(app)
oantenna1.frequency = 12.0
oantenna1.model_hfss()
oantenna1.setup_hfss()
...
aedtapp.release_desktop()
```

3.2.2 Common

This pages lists common methods available in the Antenna API:

TransmissionLine([frequency, frequency_unit])	Provides base methods common to transmission line calculations.
StandardWaveguide([frequency, frequency_unit])	Provides base methods common to standard waveguides.

ansys.aedt.toolkits.antenna.backend.antenna_models.common.TransmissionLine

`class ansys.aedt.toolkits.antenna.backend.antenna_models.common.`**`TransmissionLine`**(*frequency=10*, *frequency_unit='GHz'*)

Provides base methods common to transmission line calculations.

Parameters

frequency
[`float`, `optional`] Center frequency. The default is `10.0`.

frequency_unit
[`str`, `optional`] Frequency units. The default is `"GHz"`.

Returns

`aedt.toolkits.antenna.common.TransmissionLine`
Transmission line calculator object.

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.common import␣
↪TransmissionLine
>>> tl_calc = TransmissionLine(frequency=2)
>>> tl_calc.stripline_calculator(substrate_height=10, permittivity=2.2,␣
↪impedance=60)
```

`__init__`(*frequency=10*, *frequency_unit='GHz'*)

Methods

`__init__`([frequency, frequency_unit])	
`microstrip_calculator`(substrate_height, ...)	Use the micro strip line calculator to calculate line width and length.
`stripline_calculator`(substrate_height, ...)	Use the strip line calculator to calculate line width.
`suspended_strip_calculator`(wavelength, w1, ...)	Use the suspended strip line calculator to calculate effective permittivity.

ansys.aedt.toolkits.antenna.backend.antenna_models.common.StandardWaveguide

`class ansys.aedt.toolkits.antenna.backend.antenna_models.common.`**`StandardWaveguide`**(*frequency=10*, *frequency_unit='GHz'*)

Provides base methods common to standard waveguides.

Parameters

frequency
[float, optional] Center frequency. The default is `10.0`.

frequency_unit
[str, optional] Frequency units. The default is `"GHz"`.

Returns

aedt.toolkits.antenna.common.StandardWaveguide
Standard waveguide object.

Examples

```
>>> from ansys.aedt.toolkits.antenna.common import StandardWaveguide
>>> wg_calc = StandardWaveguide()
>>> wg_dim = wg_calc.get_waveguide_dimensions("WR-75")
```

`__init__`(*frequency=10*, *frequency_unit='GHz'*)

Methods

`__init__`([frequency, frequency_unit])	
`find_waveguide`(freq[, units])	Find the closest standard waveguide for the operational frequency.
`get_waveguide_dimensions`(name[, units])	Get waveguide dimensions.

Attributes

`waveguide_list`	Standard waveguide list.
`wg`	

You must use these methods from PyAEDT as shown in this example:

```
from ansys.aedt.toolkits.antenna.backend.antenna_models.common import TransmissionLine

# Transmission line calculation
tl_calc = TransmissionLine(frequency=2)
tl_calc.stripline_calculator(substrate_height=10, permittivity=2.2, impedance=60)
```

3.2.3 Conical spiral

This page lists the classes available for conical spiral antennas:

Archimedean(*args, **kwargs)	Manages conical archimedeal spiral antenna.

ansys.aedt.toolkits.antenna.backend.antenna_models.conical_spiral.Archimedean

class ansys.aedt.toolkits.antenna.backend.antenna_models.conical_spiral.**Archimedean**(**args*, ***kwargs*)

Manages conical archimedeal spiral antenna.

This class is accessible through the app hfss object [**?**].

Parameters

frequency
[float, optional] Center frequency. The default is `10.0`.

frequency_unit
[str, optional] Frequency units. The default is `"GHz"`.

material
[str, optional] Horn material. If a material is not defined, a new material, `parametrized`, is defined. The default is `"pec"`.

outer_boundary
[str, optional] Boundary type to use. The default is `None`. Options are `"FEBI"`, `"PML"`, `"Radiation"`, and `None`.

length_unit
[str, optional] Length units. The default is `"mm"`.

parametrized
[bool, optional] Whether to create a parametrized antenna. The default is `True`.

Returns

aedt.toolkits.antenna.Archimedean
Conical archimedean spiral object.

Notes

Examples

```
>>> from ansys.aedt.core import Hfss
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.conical_spiral import␣
↪Archimedean
>>> hfss = Hfss()
>>> antenna = Archimedean(hfss, start_frequency=20.0,
...                               stop_frequency=50.0, frequency_unit="GHz",
...                               outer_boundary='Radiation', length_unit="mm",
...                               antenna_name="Archimedean", origin=[1, 100, 50])
>>> antenna.model_hfss()
>>> antenna.setup_hfss()
>>> hfss.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

`__init__`(*args, **kwargs)	
`create_3dcomponent`([component_file, ...])	Create a 3D component of the antenna.
`create_lattice_pair`([lattice_height, ...])	Create a lattice pair box.
`duplicate_along_line`(vector[, num_clones])	Duplicate the object along a line.
`init_model`()	Create a radiation boundary.
`model_disco`()	Model in PyDiscovery.
`model_hfss`()	Draw a conical archimidean spiral antenna.
`set_variables_in_hfss`([not_used])	Create HFSS design variables.
`setup_disco`()	Set up in PyDiscovery.
`setup_hfss`()	Set up an antenna in HFSS.
`synthesis`()	Antenna synthesis.
`update_synthesis_parameters`(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Central frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Horn material.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.
`start_frequency`	Start frequency.
`stop_frequency`	Stop frequency.

You must use these methods from PyAEDT as shown in this example:

```python
from ansys.aedt.core import Hfss

from ansys.aedt.toolkits.antenna.backend.antenna_models.conical_spiral import (
    Archimedean,
)

aedtapp = Hfss()

# Create antenna
oantenna1 = RectangularPatchProbe(app)
oantenna1.frequency = 12.0
oantenna1.model_hfss()
oantenna1.setup_hfss()
...
aedtapp.release_desktop()
```

3.2.4 Helix

This pages lists the classes available for helix antennas:

AxialMode(*args, **kwargs)	Manages an axial mode helix antenna.

ansys.aedt.toolkits.antenna.backend.antenna_models.helix.AxialMode

class ansys.aedt.toolkits.antenna.backend.antenna_models.helix.**AxialMode**(**args*, ***kwargs*)

Manages an axial mode helix antenna.

This class is accessible through the Hfss object [?].

Parameters

frequency
[float, optional] Center frequency. The default is 10.0.

frequency_unit
[str, optional] Frequency units. The default is "GHz".

material
[str, optional] Helix material. If the material is not defined, a new material, parametrized, is defined. The default is "pec".

outer_boundary
[str, optional] Boundary type to use. The default is None. Options are "FEBI", "PML", "Radiation", and None.

length_unit
[str, optional] Length units. The default is "mm".

parametrized
[bool, optional] Whether to create a parametrized antenna. The default is True.

Returns

aedt.toolkits.antenna.AxialMode
Antenna object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.helix import AxialMode
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = AxialMode(app)
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> oantenna2 = AxialMode(app, origin=[200, 50, 0])
>>> oantenna2.model_hfss()
>>> oantenna2.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

`__init__`(*args, **kwargs)	
`create_3dcomponent`([component_file, ...])	Create a 3D component of the antenna.
`create_lattice_pair`([lattice_height, ...])	Create a lattice pair box.
`duplicate_along_line`(vector[, num_clones])	Duplicate the object along a line.
`init_model`()	Create a radiation boundary.
`model_disco`()	Model in PyDiscovery.
`model_hfss`()	Draw an axial mode antenna.
`set_variables_in_hfss`([not_used])	Create HFSS design variables.
`setup_disco`()	Set up model in PyDiscovery.
`setup_hfss`()	Set up an antenna in HFSS.
`synthesis`()	Antenna synthesis.
`update_synthesis_parameters`(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`direction`	Helix direction.
`feeder_length`	Helix feeder length.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`gain`	Helix expected gain.
`length_unit`	Length unit.
`material`	Helix material.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.

You must use these methods from PyAEDT as shown in this example:

```python
from ansys.aedt.core import Hfss

from ansys.aedt.toolkits.antenna.backend.antenna_models.helix import AxialMode

aedtapp = Hfss()

# Create antenna
oantenna1 = AxialMode(app)
oantenna1.model_hfss()
oantenna1.setup_hfss()
...
aedtapp.release_desktop()
```

3.2.5 Horn

This page lists the classes available for horns:

Conical(*args, **kwargs)	Manages a conical horn antenna.
Corrugated(*args, **kwargs)	Manages a corrugated horn antenna.
Elliptical(*args, **kwargs)	Manages an elliptical horn antenna.
EPlane(*args, **kwargs)	Manages an E plane horn antenna.
HPlane(*args, **kwargs)	Manages an H plane horn antenna.
Pyramidal(*args, **kwargs)	Manages a pyramidal horn antenna.
PyramidalRidged(*args, **kwargs)	Manages a pyramidal ridged horn antenna.
QuadRidged(*args, **kwargs)	Manages a quad-ridged horn antenna.

ansys.aedt.toolkits.antenna.backend.antenna_models.horn.Conical

class ansys.aedt.toolkits.antenna.backend.antenna_models.horn.**Conical**(**args*, ***kwargs*)

Manages a conical horn antenna.

This class is accessible through the app hfss object [**?**].

Parameters

frequency
[float, optional] Center frequency. The default is 10.0.

frequency_unit
[str, optional] Frequency units. The default is "GHz".

material
[str, optional] Horn material. If a material is not defined, a new material, parametrized, is defined. The default is "pec".

outer_boundary
[str, optional] Boundary type to use. The default is None. Options are "FEBI", "PML", "Radiation", and None.

length_unit
[str, optional] Length units. The default is "mm".

parametrized
[bool, optional] Whether to create a parametrized antenna. The default is True.

Returns

aedt.toolkits.antenna.ConicalHorn
Conical horn object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.horn import Conical
>>> import ansys.aedt.core
>>> oantenna1 = Conical(None)
>>> oantenna1.frequency = 12.0
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = Conical(app)
>>> oantenna1.model_hfss()
```

(continues on next page)

(continued from previous page)

```
>>> oantenna1.setup_hfss()
>>> oantenna2 = Conical(app, origin=[0.2, 0.5, 0])
>>> oantenna2.model_hfss()
>>> oantenna2.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

`__init__`(*args, **kwargs)	
`create_3dcomponent`([component_file, ...])	Create a 3D component of the antenna.
`create_lattice_pair`([lattice_height, ...])	Create a lattice pair box.
`duplicate_along_line`(vector[, num_clones])	Duplicate the object along a line.
`init_model`()	Create a radiation boundary.
`model_disco`()	Model in PyDiscovery.
`model_hfss`()	Draw a conical horn antenna.
`set_variables_in_hfss`([not_used])	Create HFSS design variables.
`setup_disco`()	Set up in PyDiscovery.
`setup_hfss`()	Set up an antenna in HFSS.
`synthesis`()	Antenna synthesis.
`update_synthesis_parameters`(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Horn material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.

ansys.aedt.toolkits.antenna.backend.antenna_models.horn.Corrugated

class `ansys.aedt.toolkits.antenna.backend.antenna_models.horn.`**Corrugated**(**args*, ***kwargs*)

Manages a corrugated horn antenna.

This class is accessible through the app hfss object [**?**].

Parameters

frequency
[`float`, `optional`] Center frequency. The default is `10.0`.

frequency_unit
[`str`, `optional`] Frequency units. The default is `"GHz"`.

material
[str, optional] Horn material. If a material is not defined, a new material, parametrized, is defined. The default is "pec".

outer_boundary
[str, optional] Boundary type to use. The default is None. Options are "FEBI", "PML", "Radiation", and None.

length_unit
[str, optional] Length units. The default is "mm".

parametrized
[bool, optional] Whether to create a parametrized antenna. The default is True.

Returns

aedt.toolkits.antenna.CorrugatedHorn
Corrugated horn object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.horn import Corrugated
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = Corrugated(app)
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

__init__(*args, **kwargs)	
create_3dcomponent([component_file, ...])	Create a 3D component of the antenna.
create_lattice_pair([lattice_height, ...])	Create a lattice pair box.
duplicate_along_line(vector[, num_clones])	Duplicate the object along a line.
init_model()	Create a radiation boundary.
model_disco()	Model in PyDiscovery.
model_hfss()	Draw a conical horn antenna.
set_variables_in_hfss([not_used])	Create HFSS design variables.
setup_disco()	Set up in PyDiscovery.
setup_hfss()	Set up an antenna in HFSS.
synthesis()	Antenna synthesis.
update_synthesis_parameters(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Horn material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.

ansys.aedt.toolkits.antenna.backend.antenna_models.horn.Elliptical

class `ansys.aedt.toolkits.antenna.backend.antenna_models.horn.`**`Elliptical`**`(*args, **kwargs)`

Manages an elliptical horn antenna.

This class is accessible through the app hfss object [**?**].

Parameters

frequency
[float, `optional`] Center frequency. The default is `10.0`.

frequency_unit
[str, `optional`] Frequency units. The default is `"GHz"`.

material
[str, `optional`] Horn material. If a material is not defined, a new material, `parametrized`, is defined. The default is `"pec"`.

outer_boundary
[str, `optional`] Boundary type to use. The default is `None`. Options are `"FEBI"`, `"PML"`, `"Radiation"`, and `None`.

length_unit
[str, `optional`] Length units. The default is `"mm"`.

parametrized
[bool, `optional`] Whether to create a parametrized antenna. The default is `True`.

Returns

`aedt.toolkits.antenna.EllipticalHorn`
Elliptical horn object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.horn import␣
↪PyramidalRidged
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = Elliptical(app)
>>> oantenna1.frequency = 12.0
```

(continues on next page)

(continued from previous page)

```
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> oantenna2 = Elliptical(app, origin=[0.2, 0.5, 0])
>>> oantenna2.model_hfss()
>>> oantenna2.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

`__init__`(*args, **kwargs)	
`create_3dcomponent`([component_file, ...])	Create a 3D component of the antenna.
`create_lattice_pair`([lattice_height, ...])	Create a lattice pair box.
`duplicate_along_line`(vector[, num_clones])	Duplicate the object along a line.
`init_model`()	Create a radiation boundary.
`model_disco`()	Model in PyDiscovery.
`model_hfss`()	Draw elliptical horn antenna.
`set_variables_in_hfss`([not_used])	Create HFSS design variables.
`setup_disco`()	Set up in PyDiscovery.
`setup_hfss`()	Set up an antenna in HFSS.
`synthesis`()	Antenna synthesis.
`update_synthesis_parameters`(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Horn material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.

ansys.aedt.toolkits.antenna.backend.antenna_models.horn.EPlane

class `ansys.aedt.toolkits.antenna.backend.antenna_models.horn.`**`EPlane`**(**args*, ***kwargs*)

Manages an E plane horn antenna.

This class is accessible through the app hfss object [**?**].

Parameters

frequency
[`float`, `optional`] Center frequency. The default is `10.0`.

frequency_unit
[str, optional] Frequency units. The default is "GHz".

material
[str, optional] Horn material. If a material is not defined, a new material, parametrized, is defined. The default is "pec".

outer_boundary
[str, optional] Boundary type to use. The default is None. Options are "FEBI", "PML", "Radiation", and None.

length_unit
[str, optional] Length units. The default is "mm".

parametrized
[bool, optional] Whether to create a parametrized antenna. The default is True.

Returns

aedt.toolkits.antenna.EPlaneHorn
E plane horn object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.horn import EPlane
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = EPlane(app)
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> oantenna2 = EPlane(app, origin=[0.2, 0.5, 0])
>>> oantenna2.model_hfss()
>>> oantenna2.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args, **kwargs*)

Methods

`__init__`(*args, **kwargs)	
`create_3dcomponent`([component_file, ...])	Create a 3D component of the antenna.
`create_lattice_pair`([lattice_height, ...])	Create a lattice pair box.
`duplicate_along_line`(vector[, num_clones])	Duplicate the object along a line.
`init_model`()	Create a radiation boundary.
`model_disco`()	Model in PyDiscovery.
`model_hfss`()	Draw E plane horn antenna.
`set_variables_in_hfss`([not_used])	Create HFSS design variables.
`setup_disco`()	Set up model in PyDiscovery.
`setup_hfss`()	Set up an antenna in HFSS.
`synthesis`()	Antenna synthesis.
`update_synthesis_parameters`(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Horn material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.

ansys.aedt.toolkits.antenna.backend.antenna_models.horn.HPlane

class `ansys.aedt.toolkits.antenna.backend.antenna_models.horn.`**`HPlane`**`(*args, **kwargs)`

Manages an H plane horn antenna.

This class is accessible through the app hfss object [**?**].

Parameters

frequency
[float, `optional`] Center frequency. The default is `10.0`.

frequency_unit
[str, `optional`] Frequency units. The default is `"GHz"`.

material
[str, `optional`] Horn material. If a material is not defined, a new material, `parametrized`, is defined. The default is `"pec"`.

outer_boundary
[str, `optional`] Boundary type to use. The default is `None`. Options are `"FEBI"`, `"PML"`, `"Radiation"`, and `None`.

length_unit
[str, `optional`] Length units. The default is `"mm"`.

parametrized
[bool, `optional`] Whether to create a parametrized antenna. The default is `True`.

Returns

`aedt.toolkits.antenna.HPlaneHorn`
H plane horn object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.horn import HPlane
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = HPlane(app)
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
```

(continues on next page)

(continued from previous page)

```
>>> oantenna1.setup_hfss()
>>> oantenna2 = HPlane(app, origin=[0.2, 0.5, 0])
>>> oantenna2.model_hfss()
>>> oantenna2.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

`__init__`(*args, **kwargs)	
`create_3dcomponent`([component_file, ...])	Create a 3D component of the antenna.
`create_lattice_pair`([lattice_height, ...])	Create a lattice pair box.
`duplicate_along_line`(vector[, num_clones])	Duplicate the object along a line.
`init_model`()	Create a radiation boundary.
`model_disco`()	Model in PyDiscovery.
`model_hfss`()	Draw H plane horn antenna.
`set_variables_in_hfss`([not_used])	Create HFSS design variables.
`setup_disco`()	Set up model in PyDiscovery.
`setup_hfss`()	Set up an antenna in HFSS.
`synthesis`()	Antenna synthesis.
`update_synthesis_parameters`(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Horn material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.

ansys.aedt.toolkits.antenna.backend.antenna_models.horn.Pyramidal

class `ansys.aedt.toolkits.antenna.backend.antenna_models.horn.`**`Pyramidal`**(**args*, ***kwargs*)

Manages a pyramidal horn antenna.

This class is accessible through the app hfss object [**?**].

Parameters

frequency
[`float`, `optional`] Center frequency. The default is `10.0`.

frequency_unit
[`str`, `optional`] Frequency units. The default is `"GHz"`.

material
[str, optional] Horn material. If a material is not defined, a new material, parametrized, is defined. The default is "pec".

outer_boundary
[str, optional] Boundary type to use. The default is None. Options are "FEBI", "PML", "Radiation", and None.

length_unit
[str, optional] Length units. The default is "mm".

parametrized
[bool, optional] Whether to create a parametrized antenna. The default is True.

Returns

aedt.toolkits.antenna.Pyramidal
Pyramidal horn object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.horn import Pyramidal
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = Pyramidal(app)
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> oantenna2 = Pyramidal(app, origin=[0.2, 0.5, 0])
>>> oantenna2.model_hfss()
>>> oantenna2.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

__init__(*args, **kwargs)	
create_3dcomponent([component_file, ...])	Create a 3D component of the antenna.
create_lattice_pair([lattice_height, ...])	Create a lattice pair box.
duplicate_along_line(vector[, num_clones])	Duplicate the object along a line.
init_model()	Create a radiation boundary.
model_disco()	Model in PyDiscovery.
model_hfss()	Draw pyramidal horn antenna.
set_variables_in_hfss([not_used])	Create HFSS design variables.
setup_disco()	Set up model in PyDiscovery.
setup_hfss()	Set up an antenna in HFSS.
synthesis()	Antenna synthesis.
update_synthesis_parameters(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Horn material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.

ansys.aedt.toolkits.antenna.backend.antenna_models.horn.PyramidalRidged

class `ansys.aedt.toolkits.antenna.backend.antenna_models.horn.`**`PyramidalRidged`**`(*args, **kwargs)`

Manages a pyramidal ridged horn antenna.

This class is accessible through the app hfss object [**?**].

Parameters

frequency
[float, `optional`] Center frequency. The default is `10.0`.

frequency_unit
[str, `optional`] Frequency units. The default is `"GHz"`.

material
[str, `optional`] Horn material. If a material is not defined, a new material, `parametrized`, is defined. The default is `"pec"`.

outer_boundary
[str, `optional`] Boundary type to use. The default is `None`. Options are `"FEBI"`, `"PML"`, `"Radiation"`, and `None`.

length_unit
[str, `optional`] Length units. The default is `"mm"`.

parametrized
[bool, `optional`] Whether to create a parametrized antenna. The default is `True`.

Returns

`aedt.toolkits.antenna.PyramidalRidged`
Pyramidal ridged horn object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.horn import␣
↪PyramidalRidged
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = PyramidalRidged(app)
```

(continues on next page)

(continued from previous page)

```
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> oantenna2 = PyramidalRidged(app, origin=[0.2, 0.5, 0])
>>> oantenna2.model_hfss()
>>> oantenna2.setup_hfss()
>>> app.release_desktop(False, False)
```

`__init__`(**args*, ***kwargs*)

Methods

`__init__`(*args, **kwargs)	
`create_3dcomponent`([component_file, ...])	Create a 3D component of the antenna.
`create_lattice_pair`([lattice_height, ...])	Create a lattice pair box.
`duplicate_along_line`(vector[, num_clones])	Duplicate the object along a line.
`init_model`()	Create a radiation boundary.
`model_disco`()	Model in PyDiscovery.
`model_hfss`()	Draw conical horn antenna.
`set_variables_in_hfss`([not_used])	Create HFSS design variables.
`setup_disco`()	Set up model in PyDiscovery.
`setup_hfss`()	Set up an antenna in HFSS.
`synthesis`()	Antenna synthesis.
`update_synthesis_parameters`(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Horn material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.

ansys.aedt.toolkits.antenna.backend.antenna_models.horn.QuadRidged

class `ansys.aedt.toolkits.antenna.backend.antenna_models.horn.`**`QuadRidged`**(**args*, ***kwargs*)

Manages a quad-ridged horn antenna.

This class is accessible through the app hfss object [?], [?], [?].

Parameters

frequency
[`float`, `optional`] Center frequency. The default is `10.0`.

frequency_unit
[str, optional] Frequency units. The default is "GHz".

material
[str, optional] Horn material. If a material is not defined, a new material, parametrized, is defined. The default is "pec".

outer_boundary
[str, optional] Boundary type to use. The default is None. Options are "FEBI", "PML", "Radiation", and None.

length_unit
[str, optional] Length units. The default is "mm".

parametrized
[bool, optional] Whether to create a parametrized antenna. The default is True.

Returns

aedt.toolkits.antenna.PyramidalRidged
Pyramidal ridged horn object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.horn import QuadRidged
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = QuadRidged(app)
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> oantenna2 = QuadRidged(app, origin=[0.2, 0.5, 0])
>>> oantenna2.model_hfss()
>>> oantenna2.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

__init__(*args, **kwargs)	
create_3dcomponent([component_file, ...])	Create a 3D component of the antenna.
create_lattice_pair([lattice_height, ...])	Create a lattice pair box.
duplicate_along_line(vector[, num_clones])	Duplicate the object along a line.
init_model()	Create a radiation boundary.
model_disco()	Model in PyDiscovery.
model_hfss()	Draw conical horn antenna.
set_variables_in_hfss([not_used])	Create HFSS design variables.
setup_disco()	Set up model in PyDiscovery.
setup_hfss()	Set up an antenna in HFSS.
synthesis()	Antenna synthesis.
update_synthesis_parameters(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Horn material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.

You must use these methods from PyAEDT as shown in this example:

```python
import ansys.aedt.core.Hfss

from ansys.aedt.toolkits.antenna.backend.antenna_models.horn import Conical

aedtapp = Hfss()

# Create antenna
oantenna1 = Conical(app)
oantenna1.frequency = 12.0
oantenna1.model_hfss()
oantenna1.setup_hfss()
...
aedtapp.release_desktop()
```

3.2.6 Patch

This page lists the classes available for patch antennas:

RectangularPatchEdge(*args, **kwargs)	Manages a rectangular patch edge antenna.
RectangularPatchProbe(*args, **kwargs)	Manages a rectangular patch antenna with a coaxial probe.
RectangularPatchInset(*args, **kwargs)	Manages a rectangular patch antenna inset fed.

ansys.aedt.toolkits.antenna.backend.antenna_models.patch.RectangularPatchEdge

class ansys.aedt.toolkits.antenna.backend.antenna_models.patch.**RectangularPatchEdge**(**args, **kwargs*)

Manages a rectangular patch edge antenna.

This class is accessible through the `Hfss` object [**?**].

Parameters

frequency
[`float`, `optional`] Center frequency. The default is `10.0`.

frequency_unit
[`str`, `optional`] Frequency units. The default is `"GHz"`.

material
[str, optional] Substrate material. If the material is not defined, a new material, parametrized, is created. The default is "FR4_epoxy".

outer_boundary
[str, optional] Boundary type to use. The default is None. Options are "FEBI", "PML", "Radiation", and None.

length_unit
[str, optional] Length units. The default is "mm".

substrate_height
[float, optional] Substrate height. The default is 1.575.

parametrized
[bool, optional] Whether to create a parametrized antenna. The default is True.

Returns

aedt.toolkits.antenna.RectangularPatchEdge
Patch antenna object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.patch import␣
↪RectangularPatchEdge
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = RectangularPatchEdge(app)
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

__init__(*args, **kwargs)	
create_3dcomponent([component_file, ...])	Create a 3D component of the antenna.
create_lattice_pair([lattice_height, ...])	Create a lattice pair box.
duplicate_along_line(vector[, num_clones])	Duplicate the object along a line.
init_model()	Create a radiation boundary.
model_disco()	Model in PyDiscovery.
model_hfss()	Draw a rectangular patch edge antenna inset fed.
set_variables_in_hfss([not_used])	Create HFSS design variables.
setup_disco()	Set up the model in PyDiscovery.
setup_hfss()	Set up an antenna in HFSS.
synthesis()	Antenna synthesis.
update_synthesis_parameters(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Substrate material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.
`substrate_height`	Substrate height.

ansys.aedt.toolkits.antenna.backend.antenna_models.patch.RectangularPatchProbe

`class ansys.aedt.toolkits.antenna.backend.antenna_models.patch.RectangularPatchProbe(*args, **kwargs)`

Manages a rectangular patch antenna with a coaxial probe.

This class is accessible through the `Hfss` object [?].

Parameters

frequency
[`float`, `optional`] Center frequency. The default is `10.0`.

frequency_unit
[`str`, `optional`] Frequency units. The default is `"GHz"`.

material
[`str`, `optional`] Substrate material. If the material is not defined, a new material, `parametrized`, is created. The default is `"FR4_epoxy"`.

outer_boundary
[`str`, `optional`] Boundary type to use. The default is `None`. Options are `"FEBI"`, `"PML"`, `"Radiation"`, and `None`.

length_unit
[`str`, `optional`] Length units. The default is `"mm"`.

substrate_height
[`float`, `optional`] Substrate height. The default is `1.575`.

parametrized
[bool, `optional`] Whether to create a parametrized antenna. The default is `True`.

Returns

`aedt.toolkits.antenna.RectangularPatchProbe`
Patch antenna object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.patch import␣
↪RectangularPatchProbe
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = RectangularPatchProbe(app)
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> app.release_desktop(False, False)
```

__init__(**args*, ***kwargs*)

Methods

`__init__`(*args, **kwargs)	
`create_3dcomponent`([component_file, ...])	Create a 3D component of the antenna.
`create_lattice_pair`([lattice_height, ...])	Create a lattice pair box.
`duplicate_along_line`(vector[, num_clones])	Duplicate the object along a line.
`init_model`()	Create a radiation boundary.
`model_disco`()	Model in PyDiscovery.
`model_hfss`()	Draw rectangular patch antenna with coaxial probe.
`set_variables_in_hfss`([not_used])	Create HFSS design variables.
`setup_disco`()	Set up the model in PyDiscovery.
`setup_hfss`()	Set up an antenna in HFSS.
`synthesis`()	Antenna synthesis.
`update_synthesis_parameters`(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Substrate material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.
`substrate_height`	Substrate height.

ansys.aedt.toolkits.antenna.backend.antenna_models.patch.RectangularPatchInset

class ansys.aedt.toolkits.antenna.backend.antenna_models.patch.**RectangularPatchInset**(**args*, ***kwargs*)

Manages a rectangular patch antenna inset fed.

This class is accessible through the `Hfss` object [**?**].

Parameters

frequency
[float, optional] Center frequency. The default is `10.0`.

frequency_unit
[str, optional] Frequency units. The default is `"GHz"`.

material
[str, optional] Substrate material. If the material is not defined, a new material, `parametrized`, is created. The default is `"FR4_epoxy"`.

outer_boundary
[str, optional] Boundary type to use. The default is `None`. Options are `"FEBI"`, `"PML"`, `"Radiation"`, and `None`.

length_unit
[str, optional] Length units. The default is `"mm"`.

substrate_height
[float, optional] Substrate height. The default is `1.575`.

parametrized
[bool, optional] Whether to create a parametrized antenna. The default is `True`.

Returns

`aedt.toolkits.antenna.RectangularPatchInset`
Patch antenna object.

Notes

Examples

```
>>> from ansys.aedt.toolkits.antenna.backend.antenna_models.patch import␣
↪RectangularPatchInset
>>> import ansys.aedt.core
>>> app = ansys.aedt.core.Hfss()
>>> oantenna1 = RectangularPatchInset(app)
>>> oantenna1.frequency = 12.0
>>> oantenna1.model_hfss()
>>> oantenna1.setup_hfss()
>>> app.release_desktop(False, False)
```

`__init__`(**args*, ***kwargs*)

Methods

`__init__`(*args, **kwargs)	
`create_3dcomponent`([component_file, ...])	Create a 3D component of the antenna.
`create_lattice_pair`([lattice_height, ...])	Create a lattice pair box.
`duplicate_along_line`(vector[, num_clones])	Duplicate the object along a line.
`init_model`()	Create a radiation boundary.
`model_disco`()	Model in PyDiscovery.
`model_hfss`()	Draw a rectangular patch antenna inset fed.
`set_variables_in_hfss`([not_used])	Create HFSS design variables.
`setup_disco`()	Set up the model in PyDiscovery.
`setup_hfss`()	Set up an antenna in HFSS.
`synthesis`()	Antenna synthesis.
`update_synthesis_parameters`(new_params)	Update the synthesis parameter from the antenna list.

Attributes

`antenna_type`	
`coordinate_system`	Reference coordinate system.
`frequency`	Center frequency.
`frequency_unit`	Frequency units.
`length_unit`	Length unit.
`material`	Substrate material.
`material_properties`	Substrate material properties.
`name`	Antenna name.
`origin`	Antenna origin.
`outer_boundary`	Outer boundary.
`substrate_height`	Substrate height.

You must use these methods from PyAEDT as shown in this example:

```python
from ansys.aedt.core import Hfss

from ansys.aedt.toolkits.antenna.backend.antenna_models.patch import (
    RectangularPatchEdge,
)

aedtapp = Hfss()

# Create antenna
oantenna1 = RectangularPatchProbe(app)
oantenna1.frequency = 12.0
oantenna1.model_hfss()
oantenna1.setup_hfss()
...
aedtapp.release_desktop()
```

You use the Antenna API at the model level from PyAEDT.

You can create one or more antennas. An antenna is object-oriented. You can synthesis an antenna without AEDT.

This code shows how to synthesis an antenna:

```python
# Import backend
from ansys.aedt.toolkits.antenna.backend.models.horn import Conical

# Synthesize antenna
oantenna1 = Conical()
oantenna1.frequency = 12.0
```

This code shows how to synthesize and create a model of an antenna in HFSS:

```python
# Import HFSS
from ansys.aedt.core import Hfss

# Import backend
from ansys.aedt.toolkits.antenna.backend.models.horn import Conical

# Synthesize antenna
aedtapp = Hfss()

# Create antenna
oantenna1 = Conical(app)
oantenna1.model_hfss()
oantenna1.setup_hfss()
...
aedtapp.release_desktop()
```

CHAPTER

FOUR

EXAMPLES

End-to-end examples show how to use the API of the AEDT Antenna Toolkit.

4.1 Antenna synthesis

These examples show how to use the different antenna classes:

4.1.1 Bowtie antenna synthesis

This example demonstrates how to synthesize a bowtie antenna using the `BowTieRounded` class. It initiates AEDT through PyAEDT, sets up an empty HFSS design, and proceeds to create the antenna.

Perform required imports

Import the antenna toolkit class and PyAEDT.

```
[1]: import tempfile
```

```
[2]: import ansys.aedt.core
```

```
[3]: from ansys.aedt.toolkits.antenna.backend.antenna_models.bowtie import BowTieRounded
```

Set AEDT version

Set AEDT version.

```
[4]: aedt_version = "2024.2"
```

Set non-graphical mode

Set non-graphical mode.

```
[5]: non_graphical = True
```

Create temporary directory

```
[6]: temp_dir = tempfile.TemporaryDirectory(suffix="_ansys")
project_name = ansys.aedt.core.generate_unique_project_name(root_name=temp_dir.name,␣
↪project_name="bowtie_example")
```

Create antenna object only for synthesis

Create antenna object.

[7]:
```
oantenna1 = BowTieRounded(None)
print(
    "Arm length: {}{} at {}{}".format(
        str(oantenna1.synthesis_parameters.arm_length.value),
        oantenna1.length_unit,
        oantenna1.frequency,
        oantenna1.frequency_unit,
    )
)
```

```
Arm length: 3.7mm at 10.0GHz
```

Change synthesis frequency

Modify resonance frequency and modify parameters.

[8]:
```
oantenna1.frequency = 12.0
print(
    "Arm length: {}{} at {}{}".format(
        str(oantenna1.synthesis_parameters.arm_length.value),
        oantenna1.length_unit,
        oantenna1.frequency,
        oantenna1.frequency_unit,
    )
)
```

```
Arm length: 3.03mm at 12.0GHz
```

Create an empty HFSS design

Create an empty HFSS design.

[9]:
```
app = ansys.aedt.core.Hfss(project=project_name, version=aedt_version, non_graphical=non_
↪graphical)
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Initializing new Desktop session.
PyAEDT INFO: Log on console is enabled.
PyAEDT INFO: Log on file C:\Users\ansys\AppData\Local\Temp\pyaedt_ansys_69f9982d-bd2f-
↪4f14-9932-f1b1a8d14699.log is enabled.
PyAEDT INFO: Log on AEDT is enabled.
PyAEDT INFO: Debug logger is disabled. PyAEDT methods will not be logged.
PyAEDT INFO: Launching PyAEDT with gRPC plugin.
PyAEDT INFO: New AEDT session is starting on gRPC port 64881
PyAEDT INFO: AEDT installation Path C:\Program Files\AnsysEM\v242\Win64
PyAEDT INFO: Ansoft.ElectronicsDesktop.2024.2 version started with process ID 6668.
PyAEDT INFO: Project bowtie_example has been created.
PyAEDT INFO: No design is present. Inserting a new design.
PyAEDT INFO: Added design 'HFSS_SUL' of type HFSS.
PyAEDT INFO: Aedt Objects correctly read
```

Create antenna in HFSS

Create antenna object, change frequency synthesis, create antenna, and set up in HFSS.

[10]:
```
oantenna1 = BowTieRounded(app)
```

```
PyAEDT INFO: Modeler class has been initialized! Elapsed time: 0m 1sec
PyAEDT INFO: Materials class has been initialized! Elapsed time: 0m 0sec
```

[11]:
```
# Create antenna in HFSS.
oantenna1.model_hfss()
```

```
PyAEDT INFO: Parsing design objects. This operation can take time
PyAEDT INFO: Parsing C:/Users/ansys/AppData/Local/Temp/tmpzuxfe7s4_ansys/pyaedt_prj_KJ6/
↪bowtie_example.aedt.
PyAEDT INFO: File C:/Users/ansys/AppData/Local/Temp/tmpzuxfe7s4_ansys/pyaedt_prj_KJ6/
↪bowtie_example.aedt correctly loaded. Elapsed time: 0m 0sec
PyAEDT INFO: aedt file load time 0.015628814697265625
PyAEDT INFO: 3D Modeler objects parsed. Elapsed time: 0m 0sec
PyAEDT INFO: Union of 2 objects has been executed.
```

Create antenna setup.

[12]:
```
oantenna1.setup_hfss()
```

```
PyAEDT INFO: Boundary Perfect E PerfE_LUL8CH has been correctly created.
PyAEDT INFO: Boundary Perfect E PerfE_169KJN has been correctly created.
PyAEDT INFO: Boundary AutoIdentify port_Patch_QBK4XP_1 has been correctly created.
```

[12]:
```
True
```

Change default name.

[13]:
```
oantenna1.name = "MyAmazingAntenna"
```

Create antenna in HFSS

Create antenna object, change origin parameter in the antenna definition, create antenna, and set up in HFSS.

[14]:
```
oantenna2 = BowTieRounded(app, origin=[2, 5, 0], name="MyAntenna")
oantenna2.model_hfss()
oantenna2.setup_hfss()
```

```
PyAEDT INFO: Union of 2 objects has been executed.
PyAEDT INFO: Boundary Perfect E PerfE_YWOJIC has been correctly created.
PyAEDT INFO: Boundary Perfect E PerfE_9KDIQ7 has been correctly created.
PyAEDT INFO: Boundary AutoIdentify port_MyAntenna_1 has been correctly created.
```

[14]:
```
True
```

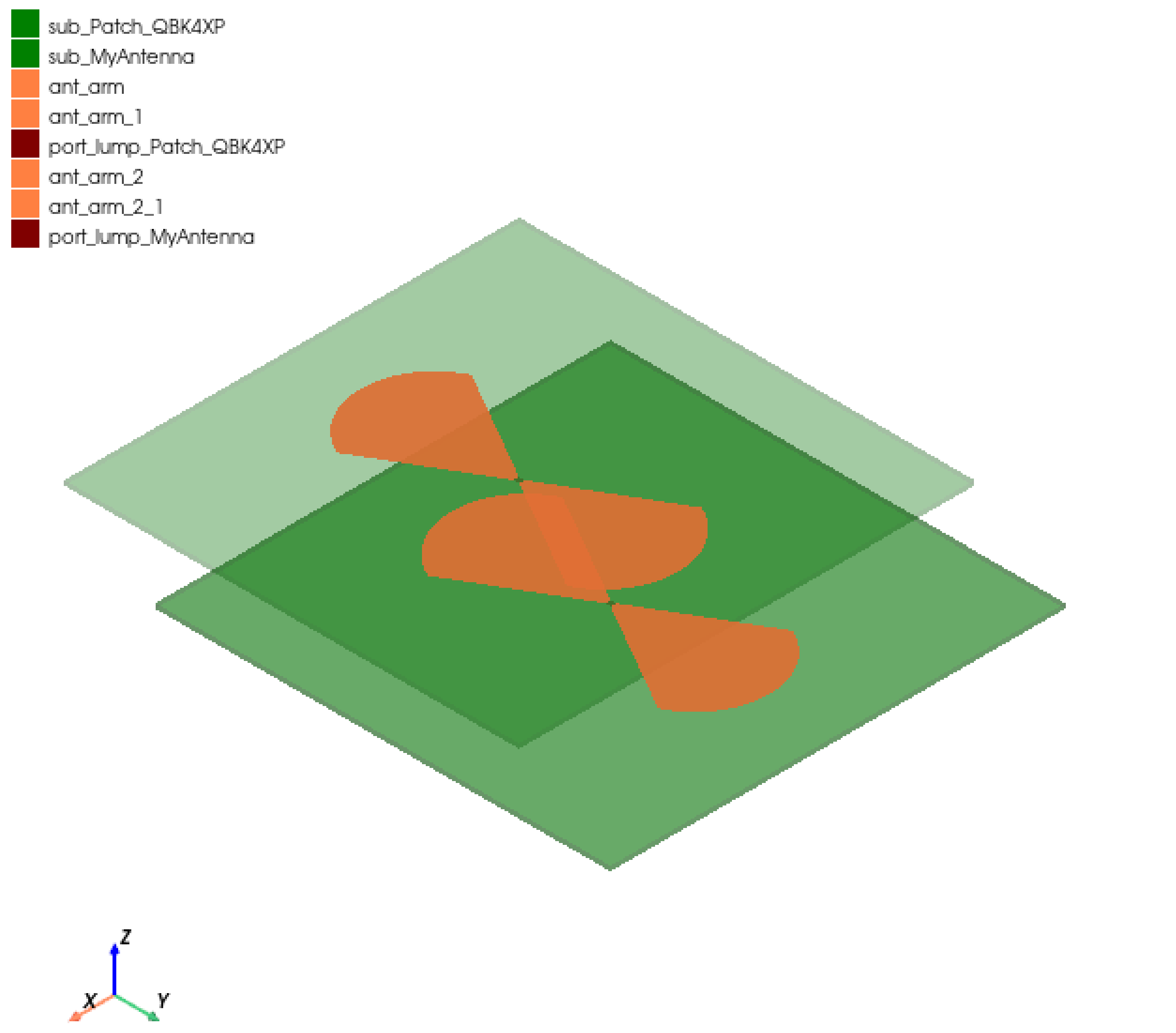
Plot HFSS model

Plot geometry with PyVista.

[15]:
```
app.plot()
```

```
PyAEDT INFO: PostProcessor class has been initialized! Elapsed time: 0m 0sec
PyAEDT INFO: Post class has been initialized! Elapsed time: 0m 0sec
```

```
C:\Users\Public\actions-runner\_work\pyaedt-toolkits-antenna\pyaedt-toolkits-antenna\.
↪venv\lib\site-packages\pyvista\jupyter\notebook.py:37: UserWarning: Failed to use␣
↪notebook backend:

No module named 'trame'

Falling back to a static output.
  warnings.warn(
```



```
[15]: <ansys.aedt.core.visualization.plot.pyvista.ModelPlotter at 0x1f42bd4a7f0>
```

Release AEDT

Release AEDT.

```
[16]: app.release_desktop(True, True)
```

```
PyAEDT INFO: Desktop has been released and closed.
```

```
[16]: True
```

Clean temporary directory

```
[17]: temp_dir.cleanup()
```

4.2 Antenna toolkit

These examples show how to use the `ToolkitBackend` class:

4.2.1 Antenna toolkit example

This example demonstrates how to use the `ToolkitBackend` class. It initiates AEDT through PyAEDT, sets up an empty HFSS design, and proceeds to create the antenna.

Perform required imports

```
[1]: import sys
     import tempfile
```

```
[2]: from ansys.aedt.core import generate_unique_project_name
     from ansys.aedt.core.generic.farfield_visualization import FfdSolutionData
```

```
---------------------------------------------------------------------------
ModuleNotFoundError                       Traceback (most recent call last)
Cell In[2], line 2
      1 from ansys.aedt.core import generate_unique_project_name
----> 2 from ansys.aedt.core.generic.farfield_visualization import FfdSolutionData

ModuleNotFoundError: No module named 'ansys.aedt.core.generic.farfield_visualization'
```

```
[3]: from ansys.aedt.toolkits.antenna.backend.api import ToolkitBackend
     from ansys.aedt.toolkits.antenna.backend.models import properties
```

Set AEDT version

Set AEDT version.

```
[4]: aedt_version = "2024.2"
```

Set non-graphical mode

Set non-graphical mode.

```
[5]: non_graphical = True
```

Create temporary directory

[6]:
```
temp_dir = tempfile.TemporaryDirectory(suffix="_ansys")
project_name = generate_unique_project_name(root_name=temp_dir.name, project_name=
↪"antenna_toolkit")
```

Set default properties

[7]:
```
properties.aedt_version = aedt_version
properties.non_graphical = non_graphical
properties.active_project = project_name
```

Initialize toolkit

Initialize the toolkit.

[8]:
```
toolkit_api = ToolkitBackend()
```

Get available_antennas

[9]:
```
print(toolkit_api.available_antennas)
```

```
['BowTieNormal', 'BowTieRounded', 'BowTieSlot', 'Archimedean', 'Log', 'Sinuous',
↪'AxialMode', 'Conical', 'Corrugated', 'EPlane', 'Elliptical', 'HPlane', 'Pyramidal',
↪'PyramidalRidged', 'QuadRidged', 'RectangularPatchEdge', 'RectangularPatchInset',
↪'RectangularPatchProbe']
```

Get default properties

[10]:
```
backend_properties = toolkit_api.get_properties()
frequency = backend_properties["antenna"]["synthesis"]["frequency"]
frequency_units = backend_properties["antenna"]["synthesis"]["frequency_unit"]
length_unit = backend_properties["antenna"]["synthesis"]["length_unit"]
```

Modify default length units

[11]:
```
properties.antenna.synthesis.length_unit = "cm"
```

Create antenna object only for synthesis

Create antenna object.

[12]:
```
antenna_parameters_1 = toolkit_api.get_antenna("RectangularPatchProbe", synth_only=True)
```

```
INFO - AEDT is released.
```

[13]:
```
print(
    "Patch X length: {}{} at {}{}".format(
        str(antenna_parameters_1["patch_x"]),
        length_unit,
        frequency,
        frequency_units,
```

(continues on next page)

(continued from previous page)

```
    )
)
```

```
Patch X length: 0.912871meter at 10.0GHz
```

Change synthesis frequency

Modify resonance frequency and modify parameters with the `set_properties()` method.

[14]:
```
new_frequency1 = 12.0
new_properties = {"frequency": new_frequency1}
toolkit_api.set_properties(new_properties)
```

```
INFO - Updating internal properties.
DEBUG - Updating 'frequency' with value 12.0
DEBUG - Properties were updated successfully.
```

[14]:
```
(True, 'Properties were updated successfully.')
```

[15]:
```
antenna_parameters_2 = toolkit_api.get_antenna("RectangularPatchProbe", synth_only=True)
```

```
INFO - AEDT is released.
```

[16]:
```
print(
    "Patch X length: {}{} at {}{}".format(
        str(antenna_parameters_2["patch_x"]),
        length_unit,
        new_frequency1,
        frequency_units,
    )
)
```

```
Patch X length: 0.760726meter at 12.0GHz
```

Change synthesis frequency

Modify resonance frequency with properties directly.

[17]:
```
new_frequency2 = 15.0
properties.antenna.synthesis.frequency = new_frequency2
```

[18]:
```
antenna_parameters_3 = toolkit_api.get_antenna("RectangularPatchProbe", synth_only=True)
```

```
INFO - AEDT is released.
```

[19]:
```
print(
    "Patch X length: {}{} at {}{}".format(
        str(antenna_parameters_3["patch_x"]),
        length_unit,
        new_frequency2,
        frequency_units,
    )
)
```

```
Patch X length: 0.608581meter at 15.0GHz
```

Initialize AEDT

Launch a new AEDT session in a thread.

[20]:
```
thread_msg = toolkit_api.launch_thread(toolkit_api.launch_aedt)
```

```
DEBUG - Starting thread: Toolkit_Thread
DEBUG - Toolkit is not connected to AEDT.
DEBUG - Launching AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Initializing new Desktop session.
```

Wait for the toolkit thread to be idle

Wait for the toolkit thread to be idle and ready to accept a new task.

[21]:
```
idle = toolkit_api.wait_to_be_idle()
if not idle:
    print("AEDT not initialized.")
    sys.exit()
```

```
DEBUG - Toolkit is busy and processing a task.
DEBUG - Toolkit is busy and processing a task.
DEBUG - Toolkit is busy and processing a task.
DEBUG - Toolkit is busy and processing a task.
DEBUG - Toolkit is busy and processing a task.
DEBUG - Toolkit is idle and ready to accept a new task.
```

Connect to HFSS design

Create an HFSS design.

[22]:
```
toolkit_api.connect_design("HFSS")
```

```
DEBUG - Toolkit is not connected to AEDT.
DEBUG - Connecting AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Initializing new Desktop session.
PyAEDT WARNING: Argument `specified_version` is deprecated for method `__init__`; use␣
↪`version` instead.
PyAEDT WARNING: Argument `new_desktop_session` is deprecated for method `__init__`; use␣
↪`new_desktop` instead.
PyAEDT INFO: Log on console is enabled.
PyAEDT INFO: Log on file C:\Users\ansys\AppData\Local\Temp\pyaedt_ansys_1e1f6c71-af64-
↪4eea-9898-e2236527b89a.log is enabled.
PyAEDT INFO: Log on AEDT is disabled.
PyAEDT INFO: Debug logger is disabled. PyAEDT methods will not be logged.
```

(continues on next page)

(continued from previous page)

```
PyAEDT INFO: Launching PyAEDT with gRPC plugin.
PyAEDT INFO: Connecting to AEDT session on gRPC port 64456
PyAEDT INFO: AEDT installation Path C:\Program Files\AnsysEM\v242\Win64
```

```
DEBUG - Toolkit is connected to AEDT.
```

```
PyAEDT WARNING: Argument `designname` is deprecated for method `__init__`; use `design`␣
↪instead.
PyAEDT WARNING: Argument `projectname` is deprecated for method `__init__`; use␣
↪`project` instead.
PyAEDT WARNING: Argument `specified_version` is deprecated for method `__init__`; use␣
↪`version` instead.
PyAEDT WARNING: Argument `new_desktop_session` is deprecated for method `__init__`; use␣
↪`new_desktop` instead.
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Returning found Desktop session with PID 7028!
PyAEDT INFO: Project antenna_toolkit has been created.
PyAEDT INFO: Added design 'HFSS_71H55M' of type HFSS.
PyAEDT INFO: Aedt Objects correctly read
PyAEDT INFO: Project antenna_toolkit Saved correctly
```

```
DEBUG - Project name: antenna_toolkit
INFO - Updating internal properties.
DEBUG - Updating 'project_list' with value ['C:/Users/ansys/AppData/Local/Temp/tmp_
↪4qsid0d_ansys/pyaedt_prj_IA2/antenna_toolkit.aedt']
DEBUG - Updating 'active_design' with value HFSS_71H55M
DEBUG - Updating 'active_project' with value C:/Users/ansys/AppData/Local/Temp/tmp_
↪4qsid0d_ansys/pyaedt_prj_IA2/antenna_toolkit.aedt
DEBUG - Updating 'design_list' with value {'antenna_toolkit': ['HFSS_71H55M']}
DEBUG - Properties were updated successfully.
INFO - Toolkit is connected to AEDT design.
```

[22]:
```
True
```

Create setup when antenna is created

Set create_setup property.

[23]:
```python
properties.antenna.setup.create_setup = True
properties.antenna.synthesis.outer_boundary = "Radiation"
```

Create antenna in HFSS

Create antenna and set up in HFSS.

[24]:
```python
antenna_parameter = toolkit_api.get_antenna("RectangularPatchProbe")
```

```
PyAEDT INFO: Modeler class has been initialized! Elapsed time: 0m 3sec
PyAEDT INFO: Materials class has been initialized! Elapsed time: 0m 0sec
PyAEDT INFO: Open Region correctly created.
PyAEDT INFO: Project antenna_toolkit Saved correctly
PyAEDT WARNING: Argument `cs_plane` is deprecated for method `create_circle`; use␣
```

(continues on next page)

(continued from previous page)

```
↪`orientation` instead.
PyAEDT WARNING: Argument `cs_plane` is deprecated for method `create_circle`; use␣
↪`orientation` instead.
PyAEDT INFO: Boundary Perfect E PerfE_N9SQZ5 has been correctly created.
PyAEDT INFO: Boundary Perfect E PerfE_6HLLNG has been correctly created.
PyAEDT INFO: Boundary Perfect E PerfE_L21WCO has been correctly created.
PyAEDT INFO: Boundary AutoIdentify port_Patch_5HSF7G_1 has been correctly created.
PyAEDT INFO: Project antenna_toolkit Saved correctly
PyAEDT INFO: Desktop has been released.
```

```
INFO - AEDT is released.
```

Try. to create antenna

The AEDT Antenna Toolkit API does not allow the creation of more than one antenna. However, you can use the antenna models API to create more than one antenna.

[25]:
```
new_antenna = toolkit_api.get_antenna("BowTie")
```

```
DEBUG - Antenna is already created.
```

[26]:
```
print(new_antenna)
```

```
False
```

Set properties

Move antenna X position

[27]:
```
toolkit_api.update_hfss_parameters("pos_x", "20")
```

```
DEBUG - Toolkit is not connected to AEDT.
DEBUG - Connecting AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Initializing new Desktop session.
PyAEDT WARNING: Argument `specified_version` is deprecated for method `__init__`; use␣
↪`version` instead.
PyAEDT WARNING: Argument `new_desktop_session` is deprecated for method `__init__`; use␣
↪`new_desktop` instead.
PyAEDT INFO: Log on console is enabled.
PyAEDT INFO: Log on file C:\Users\ansys\AppData\Local\Temp\pyaedt_ansys_1e1f6c71-af64-
↪4eea-9898-e2236527b89a.log is enabled.
PyAEDT INFO: Log on AEDT is disabled.
PyAEDT INFO: Debug logger is disabled. PyAEDT methods will not be logged.
PyAEDT INFO: Launching PyAEDT with gRPC plugin.
PyAEDT INFO: Connecting to AEDT session on gRPC port 64456
PyAEDT INFO: AEDT installation Path C:\Program Files\AnsysEM\v242\Win64
```

```
DEBUG - Toolkit is connected to AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
```

(continues on next page)

(continued from previous page)

```
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Returning found Desktop session with PID 7028!
PyAEDT INFO: Project antenna_toolkit set to active.
PyAEDT INFO: Aedt Objects correctly read
```

```
INFO - Toolkit is connected to AEDT design.
```

```
PyAEDT INFO: Desktop has been released.
```

```
INFO - AEDT is released.
```

[27]:
```
True
```

Fit all

[28]:
```
toolkit_api.connect_design()
```

```
DEBUG - Toolkit is not connected to AEDT.
DEBUG - Connecting AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Initializing new Desktop session.
PyAEDT WARNING: Argument `specified_version` is deprecated for method `__init__`; use␣
↪`version` instead.
PyAEDT WARNING: Argument `new_desktop_session` is deprecated for method `__init__`; use␣
↪`new_desktop` instead.
PyAEDT INFO: Log on console is enabled.
PyAEDT INFO: Log on file C:\Users\ansys\AppData\Local\Temp\pyaedt_ansys_1e1f6c71-af64-
↪4eea-9898-e2236527b89a.log is enabled.
PyAEDT INFO: Log on AEDT is disabled.
PyAEDT INFO: Debug logger is disabled. PyAEDT methods will not be logged.
PyAEDT INFO: Launching PyAEDT with gRPC plugin.
PyAEDT INFO: Connecting to AEDT session on gRPC port 64456
PyAEDT INFO: AEDT installation Path C:\Program Files\AnsysEM\v242\Win64
```

```
DEBUG - Toolkit is connected to AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Returning found Desktop session with PID 7028!
PyAEDT INFO: Project antenna_toolkit set to active.
PyAEDT INFO: Aedt Objects correctly read
```

```
INFO - Toolkit is connected to AEDT design.
```

[28]:
```
True
```

[29]:
```
toolkit_api.aedtapp.modeler.fit_all()
```

```
PyAEDT INFO: Modeler class has been initialized! Elapsed time: 0m 0sec
```

[30]:
```
toolkit_api.release_aedt(False, False)
```

```
PyAEDT INFO: Desktop has been released.
```

```
INFO - AEDT is released.
```

```
[30]: True
```

Set properties

Move antenna X position to origin

```
[31]: toolkit_api.update_hfss_parameters("pos_x", "0")
```

```
DEBUG - Toolkit is not connected to AEDT.
DEBUG - Connecting AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Initializing new Desktop session.
PyAEDT WARNING: Argument `specified_version` is deprecated for method `__init__`; use␣
↪`version` instead.
PyAEDT WARNING: Argument `new_desktop_session` is deprecated for method `__init__`; use␣
↪`new_desktop` instead.
PyAEDT INFO: Log on console is enabled.
PyAEDT INFO: Log on file C:\Users\ansys\AppData\Local\Temp\pyaedt_ansys_1e1f6c71-af64-
↪4eea-9898-e2236527b89a.log is enabled.
PyAEDT INFO: Log on AEDT is disabled.
PyAEDT INFO: Debug logger is disabled. PyAEDT methods will not be logged.
PyAEDT INFO: Launching PyAEDT with gRPC plugin.
PyAEDT INFO: Connecting to AEDT session on gRPC port 64456
PyAEDT INFO: AEDT installation Path C:\Program Files\AnsysEM\v242\Win64
```

```
DEBUG - Toolkit is connected to AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Returning found Desktop session with PID 7028!
PyAEDT INFO: Project antenna_toolkit set to active.
PyAEDT INFO: Aedt Objects correctly read
```

```
INFO - Toolkit is connected to AEDT design.
```

```
PyAEDT INFO: Desktop has been released.
```

```
INFO - AEDT is released.
```

```
[31]: True
```

Analyze design in batch mode

```
[32]: toolkit_api.analyze()
```

```
DEBUG - Toolkit is not connected to AEDT.
DEBUG - Connecting AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
```

(continues on next page)

(continued from previous page)

```
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Initializing new Desktop session.
PyAEDT WARNING: Argument `specified_version` is deprecated for method `__init__`; use␣
↪`version` instead.
PyAEDT WARNING: Argument `new_desktop_session` is deprecated for method `__init__`; use␣
↪`new_desktop` instead.
PyAEDT INFO: Log on console is enabled.
PyAEDT INFO: Log on file C:\Users\ansys\AppData\Local\Temp\pyaedt_ansys_1e1f6c71-af64-
↪4eea-9898-e2236527b89a.log is enabled.
PyAEDT INFO: Log on AEDT is disabled.
PyAEDT INFO: Debug logger is disabled. PyAEDT methods will not be logged.
PyAEDT INFO: Launching PyAEDT with gRPC plugin.
PyAEDT INFO: Connecting to AEDT session on gRPC port 64456
PyAEDT INFO: AEDT installation Path C:\Program Files\AnsysEM\v242\Win64
```

```
DEBUG - Toolkit is connected to AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Returning found Desktop session with PID 7028!
PyAEDT INFO: Project antenna_toolkit set to active.
PyAEDT INFO: Aedt Objects correctly read
```

```
INFO - Toolkit is connected to AEDT design.
```

```
PyAEDT INFO: Project antenna_toolkit Saved correctly
PyAEDT WARNING: Argument `num_cores` is deprecated for method `analyze`; use `cores`␣
↪instead.
PyAEDT INFO: Key Desktop/ActiveDSOConfigurations/HFSS correctly changed.
PyAEDT INFO: Solving all design setups.
PyAEDT INFO: Key Desktop/ActiveDSOConfigurations/HFSS correctly changed.
PyAEDT INFO: Design setup None solved correctly in 0.0h 1.0m 5.0s
PyAEDT INFO: Desktop has been released.
```

```
INFO - AEDT is released.
```

```
[32]: True
```

Get scattering results

```
[33]: scattering_data = toolkit_api.scattering_results()
```

```
DEBUG - Toolkit is not connected to AEDT.
DEBUG - Connecting AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Initializing new Desktop session.
PyAEDT WARNING: Argument `specified_version` is deprecated for method `__init__`; use␣
↪`version` instead.
PyAEDT WARNING: Argument `new_desktop_session` is deprecated for method `__init__`; use␣
↪`new_desktop` instead.
PyAEDT INFO: Log on console is enabled.
```

(continues on next page)

(continued from previous page)

```
PyAEDT INFO: Log on file C:\Users\ansys\AppData\Local\Temp\pyaedt_ansys_1e1f6c71-af64-
↪4eea-9898-e2236527b89a.log is enabled.
PyAEDT INFO: Log on AEDT is disabled.
PyAEDT INFO: Debug logger is disabled. PyAEDT methods will not be logged.
PyAEDT INFO: Launching PyAEDT with gRPC plugin.
PyAEDT INFO: Connecting to AEDT session on gRPC port 64456
PyAEDT INFO: AEDT installation Path C:\Program Files\AnsysEM\v242\Win64
```

```
DEBUG - Toolkit is connected to AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Returning found Desktop session with PID 7028!
PyAEDT INFO: Project antenna_toolkit set to active.
PyAEDT INFO: Aedt Objects correctly read
```

```
INFO - Toolkit is connected to AEDT design.
```

```
PyAEDT INFO: Parsing C:/Users/ansys/AppData/Local/Temp/tmp_4qsid0d_ansys/pyaedt_prj_IA2/
↪antenna_toolkit.aedt.
PyAEDT INFO: File C:/Users/ansys/AppData/Local/Temp/tmp_4qsid0d_ansys/pyaedt_prj_IA2/
↪antenna_toolkit.aedt correctly loaded. Elapsed time: 0m 0sec
PyAEDT INFO: aedt file load time 0.03258109092712402
PyAEDT INFO: Modeler class has been initialized! Elapsed time: 0m 0sec
PyAEDT INFO: PostProcessor class has been initialized! Elapsed time: 0m 0sec
PyAEDT INFO: Post class has been initialized! Elapsed time: 0m 0sec
PyAEDT INFO: Solution Data Correctly Loaded.
PyAEDT INFO: Desktop has been released.
```

```
INFO - AEDT is released.
```

Get farfield results

[34]:
```
frequency_str = str(properties.antenna.synthesis.frequency) + properties.antenna.
↪synthesis.frequency_unit
farfield_metadata, farfield_frequency = toolkit_api.export_farfield(
    frequencies=frequency_str, sphere="3D", encode=False
)
```

```
DEBUG - Toolkit is not connected to AEDT.
DEBUG - Connecting AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Initializing new Desktop session.
PyAEDT WARNING: Argument `specified_version` is deprecated for method `__init__`; use␣
↪`version` instead.
PyAEDT WARNING: Argument `new_desktop_session` is deprecated for method `__init__`; use␣
↪`new_desktop` instead.
PyAEDT INFO: Log on console is enabled.
PyAEDT INFO: Log on file C:\Users\ansys\AppData\Local\Temp\pyaedt_ansys_1e1f6c71-af64-
↪4eea-9898-e2236527b89a.log is enabled.
PyAEDT INFO: Log on AEDT is disabled.
```

(continues on next page)

(continued from previous page)

```
PyAEDT INFO: Debug logger is disabled. PyAEDT methods will not be logged.
PyAEDT INFO: Launching PyAEDT with gRPC plugin.
PyAEDT INFO: Connecting to AEDT session on gRPC port 64456
PyAEDT INFO: AEDT installation Path C:\Program Files\AnsysEM\v242\Win64
```

```
DEBUG - Toolkit is connected to AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Returning found Desktop session with PID 7028!
PyAEDT INFO: Project antenna_toolkit set to active.
PyAEDT INFO: Aedt Objects correctly read
```

```
INFO - Toolkit is connected to AEDT design.
```

```
PyAEDT INFO: Project antenna_toolkit Saved correctly
PyAEDT INFO: Parsing C:/Users/ansys/AppData/Local/Temp/tmp_4qsid0d_ansys/pyaedt_prj_IA2/
↪antenna_toolkit.aedt.
PyAEDT INFO: File C:/Users/ansys/AppData/Local/Temp/tmp_4qsid0d_ansys/pyaedt_prj_IA2/
↪antenna_toolkit.aedt correctly loaded. Elapsed time: 0m 0sec
PyAEDT INFO: aedt file load time 0.03238964080810547
PyAEDT INFO: Far field sphere 3D is assigned
PyAEDT INFO: Exporting antenna metadata...
PyAEDT INFO: Modeler class has been initialized! Elapsed time: 0m 0sec
PyAEDT INFO: PostProcessor class has been initialized! Elapsed time: 0m 0sec
PyAEDT INFO: Post class has been initialized! Elapsed time: 0m 0sec
PyAEDT INFO: Antenna metadata exported.
PyAEDT INFO: Exporting geometry...
PyAEDT INFO: Exporting embedded element patterns... Done: 1.974158763885498 seconds
PyAEDT INFO: Desktop has been released.
```

```
INFO - AEDT is released.
```

Get antenna model

[35]:
```
files = toolkit_api.export_aedt_model(encode=False)
```

```
DEBUG - Toolkit is not connected to AEDT.
DEBUG - Connecting AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Initializing new Desktop session.
PyAEDT WARNING: Argument `specified_version` is deprecated for method `__init__`; use␣
↪`version` instead.
PyAEDT WARNING: Argument `new_desktop_session` is deprecated for method `__init__`; use␣
↪`new_desktop` instead.
PyAEDT INFO: Log on console is enabled.
PyAEDT INFO: Log on file C:\Users\ansys\AppData\Local\Temp\pyaedt_ansys_1e1f6c71-af64-
↪4eea-9898-e2236527b89a.log is enabled.
PyAEDT INFO: Log on AEDT is disabled.
PyAEDT INFO: Debug logger is disabled. PyAEDT methods will not be logged.
PyAEDT INFO: Launching PyAEDT with gRPC plugin.
```

(continues on next page)

(continued from previous page)

```
PyAEDT INFO: Connecting to AEDT session on gRPC port 64456
PyAEDT INFO: AEDT installation Path C:\Program Files\AnsysEM\v242\Win64
```

```
DEBUG - Toolkit is connected to AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Returning found Desktop session with PID 7028!
PyAEDT INFO: Project antenna_toolkit set to active.
PyAEDT INFO: Aedt Objects correctly read
```

```
INFO - Toolkit is connected to AEDT design.
```

```
PyAEDT INFO: Project antenna_toolkit Saved correctly
PyAEDT INFO: Parsing C:/Users/ansys/AppData/Local/Temp/tmp_4qsid0d_ansys/pyaedt_prj_IA2/
↪antenna_toolkit.aedt.
PyAEDT INFO: File C:/Users/ansys/AppData/Local/Temp/tmp_4qsid0d_ansys/pyaedt_prj_IA2/
↪antenna_toolkit.aedt correctly loaded. Elapsed time: 0m 0sec
PyAEDT INFO: aedt file load time 0.04695415496826172
PyAEDT INFO: Modeler class has been initialized! Elapsed time: 0m 0sec
PyAEDT INFO: PostProcessor class has been initialized! Elapsed time: 0m 0sec
PyAEDT INFO: Post class has been initialized! Elapsed time: 0m 0sec
PyAEDT INFO: Desktop has been released.
```

```
INFO - AEDT is released.
```

Release AEDT

Release AEDT.

[36]:
```
toolkit_api.release_aedt(True, True)
```

```
DEBUG - Toolkit is not connected to AEDT.
DEBUG - Connecting AEDT.
```

```
PyAEDT INFO: Python version 3.10.11 (tags/v3.10.11:7d4cc5a, Apr  5 2023, 00:38:17) [MSC␣
↪v.1929 64 bit (AMD64)]
PyAEDT INFO: PyAEDT version 0.11.2.
PyAEDT INFO: Initializing new Desktop session.
PyAEDT WARNING: Argument `specified_version` is deprecated for method `__init__`; use␣
↪`version` instead.
PyAEDT WARNING: Argument `new_desktop_session` is deprecated for method `__init__`; use␣
↪`new_desktop` instead.
PyAEDT INFO: Log on console is enabled.
PyAEDT INFO: Log on file C:\Users\ansys\AppData\Local\Temp\pyaedt_ansys_1e1f6c71-af64-
↪4eea-9898-e2236527b89a.log is enabled.
PyAEDT INFO: Log on AEDT is disabled.
PyAEDT INFO: Debug logger is disabled. PyAEDT methods will not be logged.
PyAEDT INFO: Launching PyAEDT with gRPC plugin.
PyAEDT INFO: Connecting to AEDT session on gRPC port 64456
PyAEDT INFO: AEDT installation Path C:\Program Files\AnsysEM\v242\Win64
```

```
DEBUG - Toolkit is connected to AEDT.
```

```
PyAEDT INFO: Desktop has been released and closed.
```

```
INFO - AEDT is released.
```

[36]:
```
True
```

Plot results

Plot exported files

[37]:
```
from ansys.aedt.core.generic.plot import ModelPlotter
```

```
---------------------------------------------------------------------------
ModuleNotFoundError                       Traceback (most recent call last)
Cell In[37], line 1
----> 1 from ansys.aedt.core.generic.plot import ModelPlotter

ModuleNotFoundError: No module named 'ansys.aedt.core.generic.plot'
```

[38]:
```
model = ModelPlotter()
for file in files:
    model.add_object(file[0], file[1], file[2])
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[38], line 1
----> 1 model = ModelPlotter()
      2 for file in files:
      3     model.add_object(file[0], file[1], file[2])

NameError: name 'ModelPlotter' is not defined
```

[39]:
```
model.plot(show=False)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[39], line 1
----> 1 model.plot(show=False)

NameError: name 'model' is not defined
```

Load far field

[40]:
```
farfield_data = FfdSolutionData(farfield_metadata)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[40], line 1
----> 1 farfield_data = FfdSolutionData(farfield_metadata)

NameError: name 'FfdSolutionData' is not defined
```

Plot far field

[41]:
```
data = farfield_data.plot_3d(show=False)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[41], line 1
----> 1 data = farfield_data.plot_3d(show=False)

NameError: name 'farfield_data' is not defined
```

Clean temporary directory

[42]:
```
temp_dir.cleanup()
```

CHAPTER

FIVE

CONTRIBUTE

Overall guidance on contributing to a PyAnsys repository appears in Contributing in the *PyAnsys Developers Guide*. Ensure that you are thoroughly familiar with this guide before attempting to contribute to PyAEDT or its toolkits.

The following contribution information is specific to PyAEDT toolkits.

5.1 Clone the repository

To clone and install the latest version of this toolkit in development mode, run:

```
git clone https://github.com/ansys/pyaedt-toolkits-antenna.git
cd pyaedt-toolkits-antenna
python -m pip install --upgrade pip
pip install -e .
```

5.2 Add new antennas

TBD

5.3 Post issues

Use the AEDT Antenna Toolkit Issues page to report bugs and request new features.

5.4 View documentation

Documentation for the latest stable release is hosted at https://aedt.antenna.toolkit.docs.pyansys.com/.

In the upper right corner of the documentations title bar, there is an option for switching from viewing the documentation for the latest stable release to viewing the documentation for the development version or previously released versions.

5.5 Adhere to code style

PyAEDT toolkit is compliant with PyAnsys code style. It uses the tool pre-commit to select the code style. You can install and activate this tool with:

```
pip install pre-commit
pre-commit run --all-files
```

You can also install this as a pre-commit hook with:

```
pre-commit install
```

This way, its not possible for you to push code that fails the style checks. For example:

```
$ pre-commit install
$ git commit -am "Add my cool feature."
black....................................................................Passed
isort (python)...........................................................Passed
flake8...................................................................Passed
codespell................................................................Passed
fix requirements.txt.....................................................Passed
blacken-docs.............................................................Passed
```

5.5.1 Maximum line length

Best practice is to keep the length at or below 120 characters for code and comments. Lines longer than this might not display properly on some terminals and tools or might be difficult to follow.

INDICES AND TABLES

- genindex
- search

BIBLIOGRAPHY

[1] C. Balanis, Wideband and Travelling-Wave Antennas, *Modern Antenna Handbook*, New York, 2008.

[1] C. Balanis, Wideband and Travelling-Wave Antennas, *Modern Antenna Handbook*, New York, 2008.

[1] C. Balanis, Wideband and Travelling-Wave Antennas, *Modern Antenna Handbook*, New York, 2008.

[1] R. Johnson, Frequency Independent Antennas, Antenna Engineering Handbook, 3rd ed. New York, McGraw-Hill, 1993.

[1] C. Balanis, Wideband and Travelling-Wave Antennas, *Modern Antenna Handbook*, New York, 2008.

[1] C. Balanis, Aperture Antennas: Analysis, Design, and Applications, *Modern Antenna Handbook*, New York, 2008.

[1] C. Balanis, Horn Antennas, Antenna Theory Analysis, 3rd ed. Hoboken: Wiley, 2005, sec. 13.6, pp. 785-791.

[1] C. Balanis, Aperture Antennas: Analysis, Design, and Applications, *Modern Antenna Handbook*, New York, 2008.

[1] C. Balanis, Aperture Antennas: Analysis, Design, and Applications, *Modern Antenna Handbook*, New York, 2008.

[1] C. Balanis, Aperture Antennas: Analysis, Design, and Applications, *Modern Antenna Handbook*, New York, 2008.

[1] C. Balanis, Aperture Antennas: Analysis, Design, and Applications, *Modern Antenna Handbook*, New York, 2008.

[1] C. Balanis, Aperture Antennas: Analysis, Design, and Applications, *Modern Antenna Handbook*, New York, 2008.

[1] K. L. Walton and V. C. Sundberg, Broadband ridged horn design, Microwave J., vol. 4, pp. 96-101, Apr. 1964.

[2] C. Bruns et al., Analysis and Simulations of a 1-18 GHz Broadband Double-Ridged Horn Antenna, IEEE Electromag. Compat., vol. 45, pp. 55-60, Feb 2003.

[3] C. Balanis, Horn Antennas, Antenna Theory Analysis, 3rd ed. Hoboken: Wiley, 2005, ch. 13.

[1] C. Balanis, Microstrip Antennas, *Antenna Theory*, 2nd Ed. New York: Wiley, 1997.

[1] C. Balanis, Microstrip Antennas, *Antenna Theory*, 2nd Ed. New York: Wiley, 1997.

[1] C. Balanis, Microstrip Antennas, *Antenna Theory*, 2nd Ed. New York: Wiley, 1997.