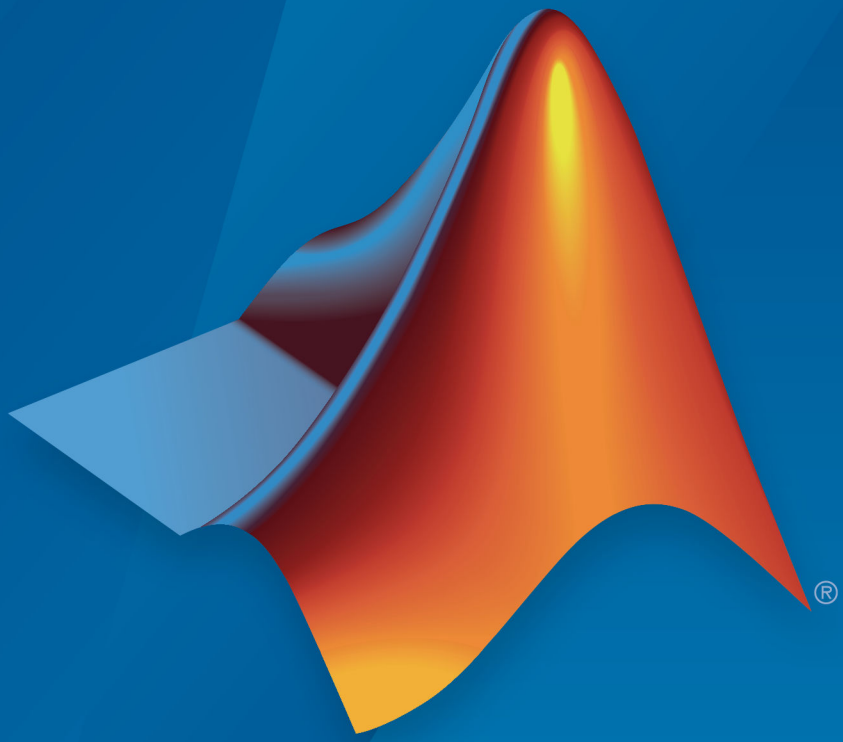
Antenna Toolbox™ Release Notes



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Antenna Toolbox™ Release Notes

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R2018b

Version: 3.2

New Features

3-D Terrain Visualization: Stream global terrain data in Site Viewer and visualize path loss computed using the Longley-Rice propagation model

You can now visualize terrain features in Site Viewer.

Use the Longley-Rice propagation model in `propagationModel` to visualize the impact of local terrain features on received signal strength.

Use the `elevation` function to calculate the ground elevation at the required site.

Use the `pattern` function to visualize antenna radiation pattern in Site Viewer.

Array Design Function: Design an array configuration with appropriate antenna spacings for a given frequency

You can now use the existing `design` function to create array configurations that operate at a specified frequency.

Array Phase Shift Function: Calculate the phase shifts of the array elements to achieve beam scanning in a particular direction

Use the `phaseShift` function to calculate a set of phase shift values that you can apply to an array operating at a specified frequency.

Bifilar and Quadrafilar Helix, Koch Curve Fractal, Sierpinski’ s Gasket, Single Arm Archimedean Spiral: Design, visualize, and analyze five additional antennas with parameterized geometry

The new objects aid in the design and visualization of new antennas:

- Use the `helixMultifilar` object to model a bifilar or quadrafilar helix antenna on a ground plane.
- Use the `dipolehelixMultifilar` object to model a bifilar or quadrafilar helix dipole antenna.

- Use `fractalKoch` object to model a Koch curve fractal antenna in an X-Y plane.
- Use `fractalGasket` object to model a Sierpinski's gasket on the X-Y plane.
- Use the existing `spiralArchimedean` object to model a single arm Archimedean spiral antenna.

Use the `show` function to view the structures of these antennas.

Parabolic Reflector: Design, visualize, and analyze an antenna in the presence of a large parabolic reflector element with parameterized geometry

Use the `reflectorParabolic` object to model a parabolic reflecting backing structure for antenna elements. Parabolic reflectors are large antennas of at least 10 wavelengths in diameter.

R2018a

Version: 3.1

New Features

Compatibility Considerations

SINR Visualization: Visualize transmitter site signal-to-interference-plus-noise ratio (SINR) on a map

Use the `sinr` function to measure the signal-to-interference-plus-noise ratio (SINR) of a receiver and display a map visualization. The SINR value is an important measure of receiver quality.

Antenna Site Visualization: Visualize line-of-sight path between transmitter/receiver sites and clustering of adjacent sites

Use the `los` function to plot the line-of-sight visibility between two sites on a map.

Meshing Engine for Metal Surfaces: Improved performance for analysis of metal antennas

The mesh generator, `mesh`, now uses new algorithms for 2-D geometries of metal antennas.

Compatibility Considerations

Resulting meshes can differ from meshes generated in previous releases. For example, meshes generated with default size controls might have fewer elements than before.

E-Shaped Patch, Triangular Patch, LPDA, and J-Dipole: Design, visualize, and analyze four additional printed antennas with parameterized geometry

The new objects aid in the design and visualization of new antennas:

- Use the `patchMicrostripEnotch`, `patchMicrostripTriangular`, and `lpda` objects to create PCB antennas.
- Use the `dipoleJ` object to model a J-pole antenna that finds applications in ham radio.

Corner Reflector: Design, visualize, and analyze an antenna in the presence of an additional reflector element with parameterized geometry

Use the `reflectorCorner` object to create a corner reflecting backing structure for antenna elements. Antennas using corner reflectors are mostly used in radar and wireless communications systems.

R2017b

Version: 3.0

New Features

PCB Stack Antenna: Design Custom PCB antennas with arbitrary metal-dielectric layers, solid feed/via models, and advanced meshing control

Use the `pcbStack` object to build custom multi-layer metal-dielectric PCB antennas. You can use this object for practical antenna designs such as cell phones, RFID, IoT applications.

Gerber File Generation from pcbstack: Prototype and implement antennas using customizable library of RF connectors and PCB manufacturing services

Printed Circuit Board (PCB) antennas are described by a set of manufacturing files collectively known as `'Gerber files'`.

Use the `PCBWriter` object or the `gerberWrite` function with the `pcbStack` object to generate Gerber files. Optionally, you can choose the RF connector for the PCB board and PCB viewer or manufacturing service.

Conversion of 2-D/2.5-D Antenna Elements to pcbStack: Design custom printed antennas using available library elements

Use `pcbStack` to convert antenna library elements for PCB-based custom printed antennas. You can now customize antenna elements by:

- Adding one or more feed points and control the excitation amplitude, phase.
- Defining one or more vias between different layers.

Inset-Fed Patch, Circular Patch, Cloverleaf, Circular Reflector, and Circular Cavity: Design, visualize, and analyze three additional antennas and two additional backing structures using parameterized geometry

The new objects aid in the design and visualization of new antennas:

- Use the `patchMicrostripInsetfed` object to feed a rectangular patch antenna using inset-feed.
- Use the `patchMicrostripCircular` object to model a circular patch antenna.
- Use `cloverleaf` object to model a wideband circularly polarized cloverleaf antenna.
- Use `sectorInvertedAmos` object to model a sector antenna the pattern of which illuminates a sector.
- Use the `cavityCircular` and `reflectorCircular` objects as backing structures for other antenna elements.

Use the `show` function to view the structures of these antennas.

Birdcage Antenna: Design, visualize, and analyze an additional antenna, including the effects of human heads modeled with phantoms

Use the `birdcage` antenna object to design, analyze, and visualize a birdcage antenna. You can use this antenna to model an MRI coil and study the performance for a loaded and unloaded MRI coil. Use the `show` function to view the structures of these antennas.

Visualization Within Dielectric Volume: Inspect charge and current separately in the metal and dielectric layers

You can now use the `charge` and `current` functions to visualize charge and current separately in metal and dielectric layers.

RF Propagation: Visualize transmitter/receiver sites, links, and coverage on map using outdoor and weather-based path loss models

Use Antenna Toolbox `txsite` and `rxsite` objects to compute and visualize antenna sites and RF propagation on a virtual globe. Computation and Visualization options include:

- Signal strength computation using free-space propagation or your choice of propagation model to include effects due to weather.
- Map-based visualization of sites and signal strength, including links for point-to-point communication and contour maps for area coverage

- High-quality map for visualizations including 3-D virtual globe.

R2017a

Version: 2.2

New Features

Plane Wave Excitation: Compute the scattering solution of antennas and arrays when excited by plane waves

Use the `planeWaveExcitation` object to excite any antenna or array from the library using a plane wave. Plane waves in Antenna Toolbox are specified using a direction vector and a polarization vector.

Antenna Designer App: Interactively select and analyze antennas with desired characteristics

Use the **Antenna Designer** app to interactively explore, design, and analyze antennas in the library. You can also select multiple antennas and compare the analysis of these antennas. Antennas designed using the app can be exported as a variable in the MATLAB® workspace, as a live script, or as a function.

Lumped RLC Load for Antenna Elements: Modify the resonant frequency using load elements at an arbitrary location on an antenna surface

You can now use the `lumpedElement` function to modify the resonant frequency of an antenna by adding the load at an arbitrary location.

Array Factor Analysis: Compute the array pattern using pattern superposition of individual antennas

Use `arrayFactor` and `patternMultiply` to calculate the array factor and the full array pattern of an antenna array. `arrayFactor` and `patternMultiply` do not consider the effect of mutual coupling between different elements in an array.

PCB Stack Antenna: Describe custom printed antennas on multilayered substrates

Use the `pcbStack` object to create structures used in the PCB-based design of antennas. Using this object, you can define:

- Multiple metal layers

- Dielectric substrate
- One or more feed points and control excitation amplitude or phase
- Any number of vias between different layers.

Custom Planar Array Geometry: Describe a custom array by defining its geometric boundaries

Use the `customArrayGeometry` function to create an array represented by 2-D custom geometry. Use the `layout` and `show` functions to view the layout and structure of the array.

Custom Ground Plane for Dielectric Structures: Model an infinite ground plane or no ground plane for antennas mounted on substrates

You can now add infinite ground plane or no ground plane to design and analyze antenna structures with dielectric such as `patch`, `cavity`, and `reflector`.

Cycloid Dipole and Blade Dipole: Design, visualize, and analyze two additional antennas using parameterized geometry

Use the `dipoleCycloid` and `dipoleBlade` antenna objects to design and analyze cycloid dipole and blade dipole antennas, respectively. Use the `show` function to view the structures of these antennas.

conformalArray: Build heterogeneous conformal antenna arrays by specifying both balanced and unbalanced antennas

You can now use the `conformalArray` object to design and analyze heterogeneous conformal arrays using balanced and unbalanced antennas. Use the `layout` and `show` function to view the layout and structures of these arrays.

R2016b

Version: 2.1

New Features

MultiLayered Dielectric Substrate: Include multilayered and thick dielectric substrate effects in antennas and antenna arrays

Use the `dielectric` function to design and analyze `patch`, `cavity`, and `reflector` antennas or array structures that have multi-layered or thick dielectric substrates.

Antenna Design Function: Design the geometric properties of antennas to resonate at a particular frequency

Use the `design` function to create an antenna object that operates at a specified frequency.

Custom Planar Antenna Geometry: Describe a custom antenna by defining its geometric boundaries

Use the `customAntennaGeometry` class to define geometric boundaries for custom antenna shapes. Use the antenna analysis functions to analyze the custom antenna geometry for its port, surface, and field characteristics. You can also use this custom antenna geometry in finite and infinite arrays.

Lumped RLC Components for Antenna Elements: Modify resonant frequency using load elements at the antenna feed point

Use the `lumpedElement` function to change the electric properties of the antenna. For example, you can increase the antenna bandwidth without changing the dimensions using RLC components.

Circular Antenna Array: Position elements of an antenna array on a circle

Use the antenna elements library to design `circularArray`. Use the `layout` function to view the placement of the different antenna elements.

Custom Patch Antenna: Create a probe-fed patch antenna with arbitrary shape

Use Double slot cavity patch on TMM10 substrate example to learn how to create an antenna using `customAntennaGeometry`. This example also shows you how to manipulate properties of an antenna using `lumpedElement` and multi-layered dielectric substrates.

Dipole Helix, Coplanar Inverted-F, and Coplanar Inverted-L Antennas: Design, visualize, and analyze three additional antennas using parameterized geometry

Use the `dipoleHelix`, `invertedFcoplanar`, and `invertedLcoplanar` antenna objects to design and analyze helix dipole, coplanar inverted-F, and coplanar inverted-L antennas, respectively. Use the `show` function to view the structures of these antennas.

R2016a

Version: 2.0

New Features

Dielectric Modeling: Account for the effects of the substrate in antennas and finite antenna arrays

Design and analyze `patch`, `cavity`, and `reflector` antenna or array structures by using dielectric material as substrates. Characterize dielectric substrates using the `dielectric` utility function and the constants and properties listed in `DielectricCatalog`.

Import Antenna Arrays as a Planar Mesh: Design antenna arrays with custom planar geometries

Use the `customArrayMesh` class to design a planar array object. Analyze the custom mesh array for its port, surface, and field characteristics using array analysis functions.

Conformal Antenna Arrays: Position the antenna elements of an array at arbitrary position

Design conformal antenna arrays using any antenna elements from Antenna Toolbox as unit cells. You can also specify an array of any shape and antenna arrangements. Analyze unit cells of the array and extract the embedded pattern using array analysis functions.

Multi-Axis Tilt Property for Antennas and Antenna Arrays: Rotate an antenna or an array around any arbitrary axis

Use the `TiltAxis` property to a rotate the antenna and array elements around any arbitrary axis.

Polar Plot: Interactively visualize the radiation pattern and perform measurements using polarpattern

Use the `polarpattern` function to plot antenna and array characteristics in polar coordinates. In the polar plot, you can:

- Use markers to enable measurements of the plotted data
- Visualize *N*-dB beamwidth
- Change the orientation of the data

Custom Pattern and Field: Visualize any arbitrary 3-D radiation pattern data or electric/magnetic field data using patternCustom and fieldsCustom

Use the `patternCustom` function to plot and visualize 2-D or 3-D radiation patterns from user specified or lab-measured antenna data recorded in CSV, text, or MAT files.

Use the `fieldsCustom` function to plot and visualize electric or magnetic fields from user specified or lab-measured antenna data recorded in CSV, text, or MAT files.

Radiation Pattern Import/Export: Import and export radiation pattern data using the MSI file format with msiread and msiwrite

Use the `msiread` function to read data from MSI files that have `.msi` or `.pln` extensions. Use the `msiwrite` function to write data into MSI files that have `.pln` extension.

Rectangular Horn and Waveguide Antennas: Design, visualize, and analyze rectangular horn and waveguide antennas with parameterized geometry

Use the `horn` and `waveguide` antennas class to design and analyze a rectangular horn and waveguide antennas, respectively. To view the structure of horn or waveguide metal antennas, use the `show` function.

R2015b

Version: 1.1

New Features

Infinite Array Object: Analyze a library antenna as a unit cell in an infinite array

Design infinite antenna arrays using antenna elements from Antenna Toolbox as unit cells. Use array analysis functions to analyze unit cells of the array and extract the embedded pattern.

Custom Planar Mesh Object: Import an arbitrary 2-D mesh to describe a custom antenna

Use the `customAntennaMesh` class to design a planar antenna object. Use the antenna analysis functions to analyze the custom mesh antenna for its port, surface, and field characteristics.

Infinite Ground Plane Specification: Model an infinite ground plane for antennas connected to the ground

Analyze and visualize properties of antenna connected to the ground plane, such as patch, monopole, and pifa in the presence of an infinite ground plane.

E-H Field Visualization: Inspect the electric and magnetic fields at an arbitrary distance from the antenna

Use `EHfields` to visualize the electric and magnetic fields of an antenna element in Antenna Toolbox.

Biquad Antenna Object: Design, visualize, and analyze biquad antennas with parameterized geometry

Use the `biquad` antenna class to design and analyze a biquad metal antenna. Use the `show` function to view the structure of the biquad metal antenna.

R2015a

Version: 1.0

New Features

Antenna library for rapid design and visualization of metal antennas using parameterized geometry

Design and analyze the structure of 22 metal antennas including dipoles, monopoles, spirals, and patches. Use the `show` function to view the structure of the metal antennas.

Antenna array design using antenna elements

Use the Antenna Toolbox library of antenna elements to design `linear` and `rectangular` antenna arrays. Use the `layout` function to view the placement of the different antenna elements in the array.

Port analysis of antennas and antenna arrays

Analyze the ports of different antennas and antenna arrays using `impedance`, `returnLoss`, and `sparameters` functions.

Field analysis of antennas and antenna arrays

Analyze and visualize the radiation pattern, E-H fields and beamwidth of different antennas and antenna arrays using `pattern`, `EHfields`, `patternAzimuth`, `patternElevation` and `beamwidth` functions.

Surface analysis of antennas and antenna arrays

Determine, visualize and analyze the surface charge and current of different antennas and antenna arrays using `charge`, and `current` functions.

Antenna array analysis for the embedded element pattern and the correlation coefficient of the elements of the array

Determine, analyze, and visualize the embedded element pattern and the correlation coefficient of elements in an array using `pattern`, and `correlation` functions.

Infinite ground plane specification for analyzing balanced antennas

Analyze and visualize balanced antenna properties, such as, dipoles and bowties in the presence of an infinite ground plane.