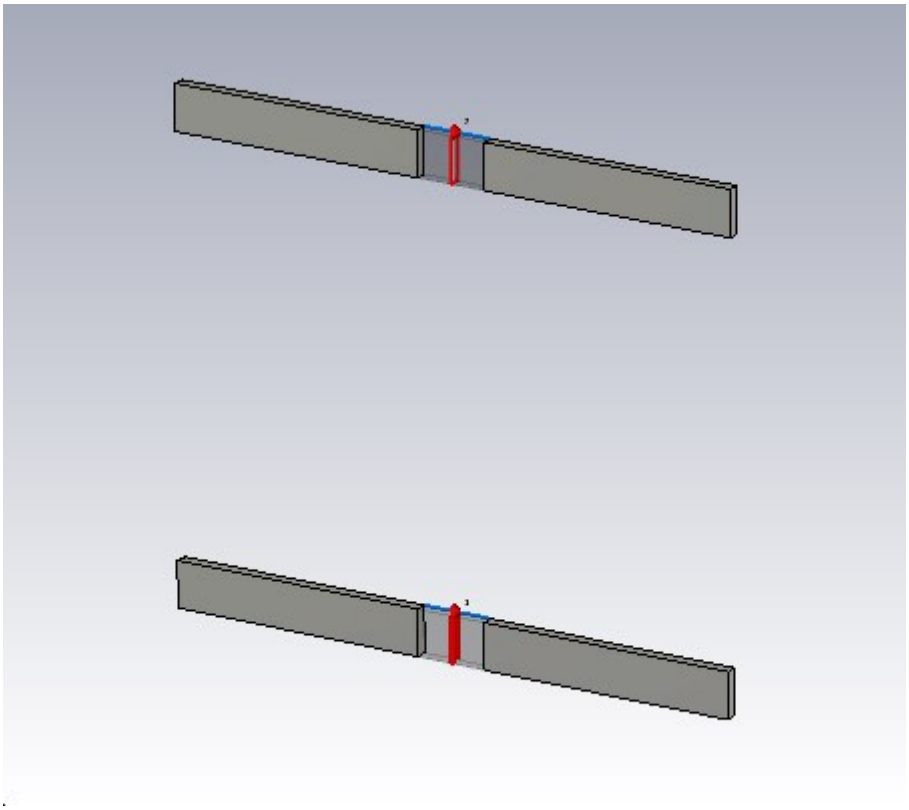
Utilize the available examples prepared in CST Studio Suite to further deepen your knowledge in the field of antennas.

Dipole Antennas over Real Ground



General Description

In this example two dipoles are located over an infinite (real) ground plane consisting of concrete.

Structure Generation

The dipoles are generated as PEC solids.

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Solver Setup

The real ground feature is *enabled* in the Special Integral Equation Solver Parameters dialog where also the real ground material is defined. The boundary conditions in direction Zmin are set to open.

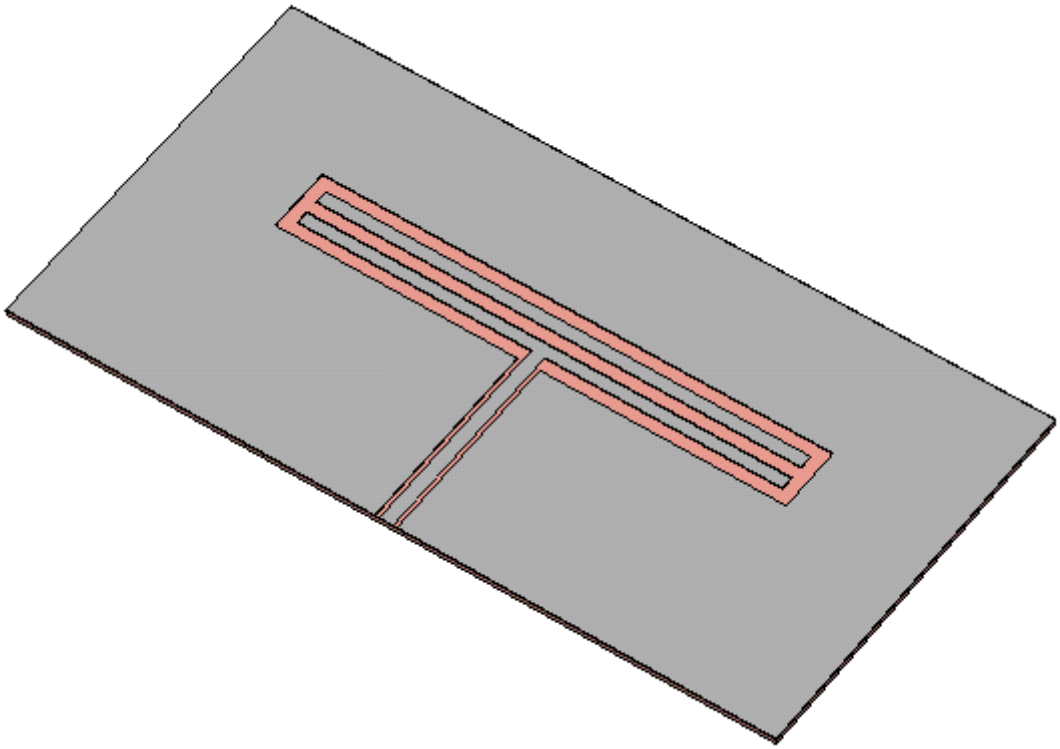
Post-Processing

The calculated *S-Parameters* are available in the result tree in the folder *1D Results*. Whereas the computed *E-* and *H-fields* can be accessed in the folder *2D/3D Results*, the radiation pattern can be investigated by visualizing the farfield results listed in the folder *Farfields* in different ways.

Folded Patch Antenna

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General Description

This example presents the farfield calculation of a triple-slot patch antenna, fixed on a dielectric substrate.

Structure Generation

The antenna is modelled by defining basic bricks, whereby some parts are mirrored regarding the symmetry of the structure. In the same sense a symmetry plane is considered to reduce the simulation time. All boundaries are open, providing in addition above and below the structure some extra space (expanded open).

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Solver Setup

In order to enable a transient calculation a waveguide port is defined as the excitation source, feeding the triple-slot antenna. Before starting the simulation, a farfield monitor as well as two 3D field monitors are set at a suitable frequency.

Post-Processing

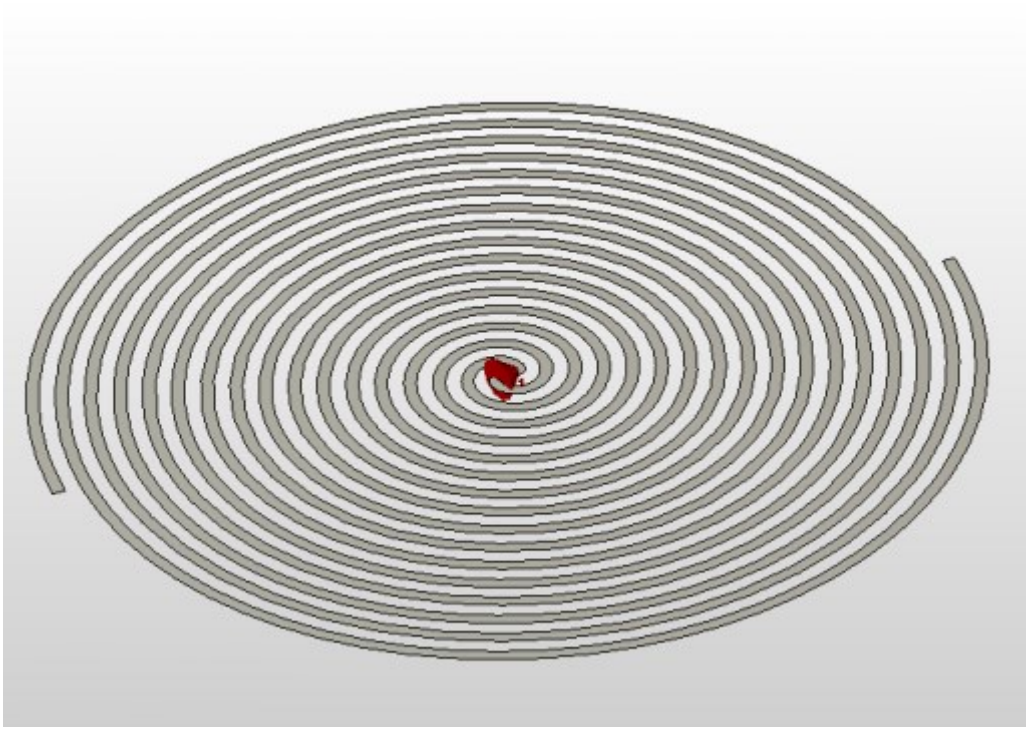
The previously defined farfield monitor offers now the possibility to investigate the radiation characteristics of the given antenna model. The farfield information is accessible via the navigation tree in the folder *Farfields*.

Furthermore, the time signals as well as the scattering parameters of the excitation port are listed in the folder *1D Results* and the mode information of the waveguide port in the folder *2D/3D Results*. In addition, the voltage standing wave ratio (VSWR) is calculated giving information about the impedance mismatch of the antenna over the chosen frequency range. The VSWR results are also listed in the *1D Results* folder.

S-Parameter and Farfield Calculation of a Spiral Antenna

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General Description

In this example the calculation of the S-Parameter and the farfield of a spiral antenna are presented. The antenna is placed above an infinite ground plane.

Structure Generation

The structure is constructed by using the predefined macro Home: ***Macros*** **> *Construct* > *Coils* > *Planar Circular Spiral - rectangular cross section*** and some additional construction steps to construct an infinitely thin PEC sheet antenna.

Solver Setup

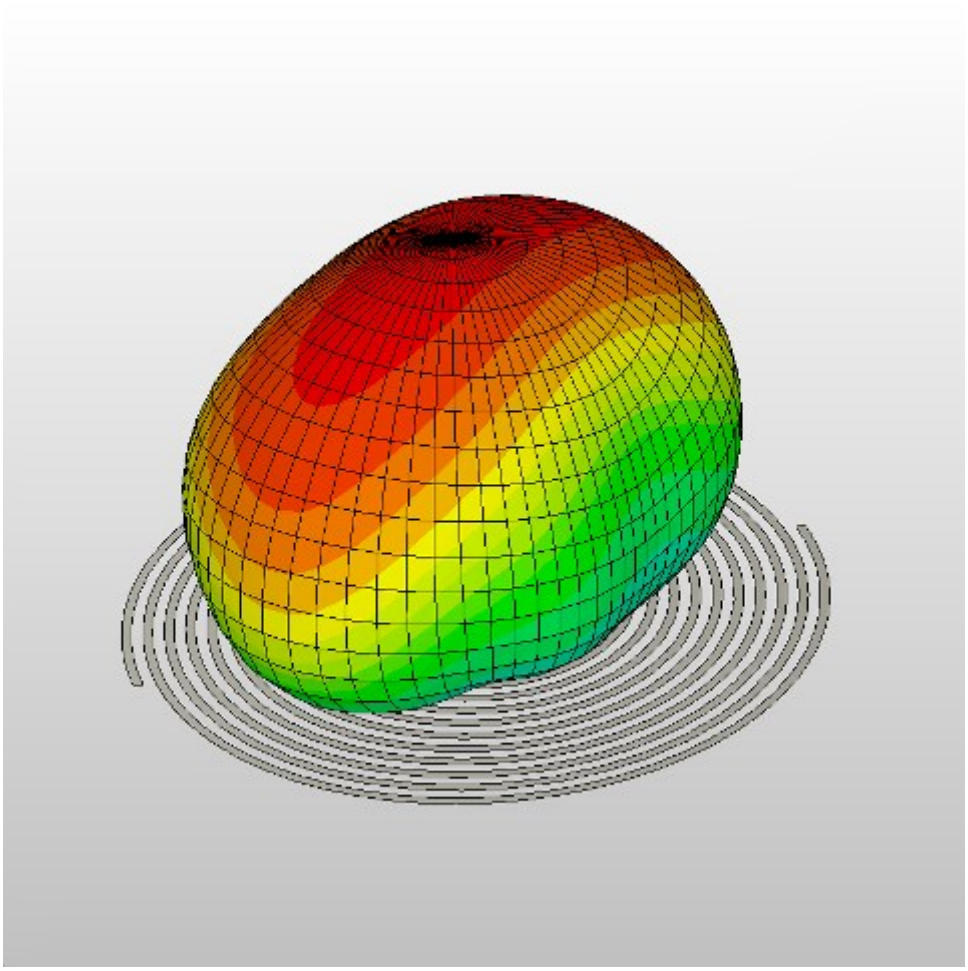
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As excitation a discrete face port is defined as well as a farfield monitor at 5.87 GHz. In the special solver parameters, the option *Treat electric boundary condition as infinite ground plane (ZMin)* is enabled. For a fast broadband S-Parameter calculation the option "Use broadband frequency sweep" is enabled.

Post-Processing

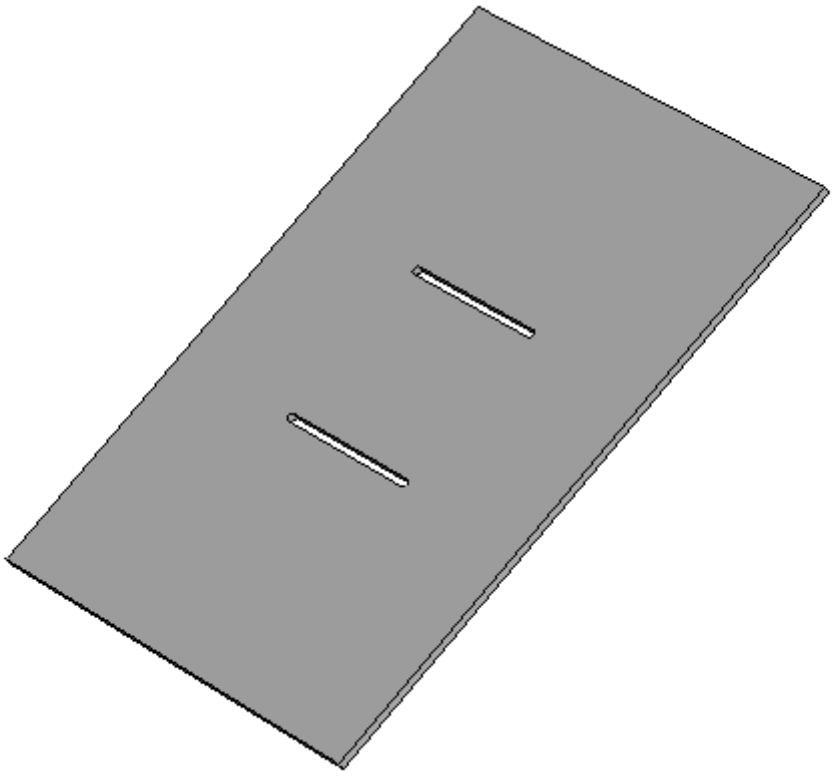
The farfield information is stored in the folder *Farfield* in the navigation tree. The calculated S-Parameter can be found in the *1D Results* folder.



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Two Slots in Plane Antenna



General Description

This example shows the calculation of farfields and electric fields of a two-slot antenna. The antenna consists of a thin metal plane with two slots cut into the plane and is stimulated by a plane wave.

Structure Generation

The antenna is created using basic bricks and cylinders. All these objects are of PEC material. First a thin metal plane is modelled by a brick. The slots are created by using different Boolean operations on additional cylinders and bricks as well as by applying transform operations.

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Solver Setup

A plane wave is defined on one side of the metal plane to stimulate the antenna. All calculation domain boundary conditions are set to "open". Magnetic and electric symmetry planes are used to reduce the calculation time.

Time domain and frequency domain based electric field monitors allow the visualization of the electric field. In addition, a probe is defined to record the electric field behind one of the slots. Further on, farfield characteristics of the antenna are recorded with farfield monitors at different frequencies.

Post-Processing

The signal recorded with the previously defined probe can be accessed in the *1D Results > Probes > E-Field* subfolder.

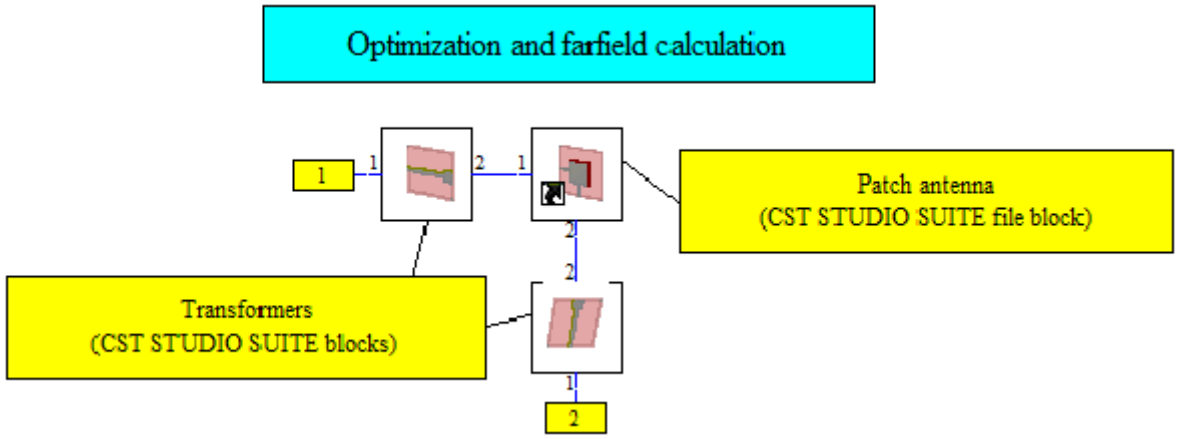
The farfield results are listed in subfolders of *Farfields* in the navigation tree. The electric field distribution can be accessed in subfolders of *2D/3D Results > E-Field* in the navigation tree. Both time and frequency domain monitors are listed here.

In addition, the electric field of one monitor is recorded along a previously defined curve using the 2D/3D Plot: ***Evaluate Fields > Evaluate Field on Curve*** option.

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Matched Antenna Optimization



General Description

The transformer blocks' parameters are optimized to obtain perfect match between the transformers and the antenna. Finally, an antenna calculation is performed from within CST DESIGN STUDIO.

Model Description

The CST MICROWAVE STUDIO model of a patch antenna is imported as a CST MICROWAVE STUDIO file block because no modifications will be performed from within CST DESIGN STUDIO for this block. The transformers are parameterized CST MICROWAVE STUDIO blocks copied from the same CST MICROWAVE STUDIO project. Consequently, they will use the same cache during the optimization process.

In the optimization task "Opt1" the transformers are optimized to obtain a perfect match. The initial values are width1 = width2 = 1.0. After the optimization, an AC-task with an enabled "Combine Result" feature is performed. This simulation calculates the performance of the antenna including the matching network. To see the farfields, open the MWS1 block and visualize the Farfields with the [AC1] label.

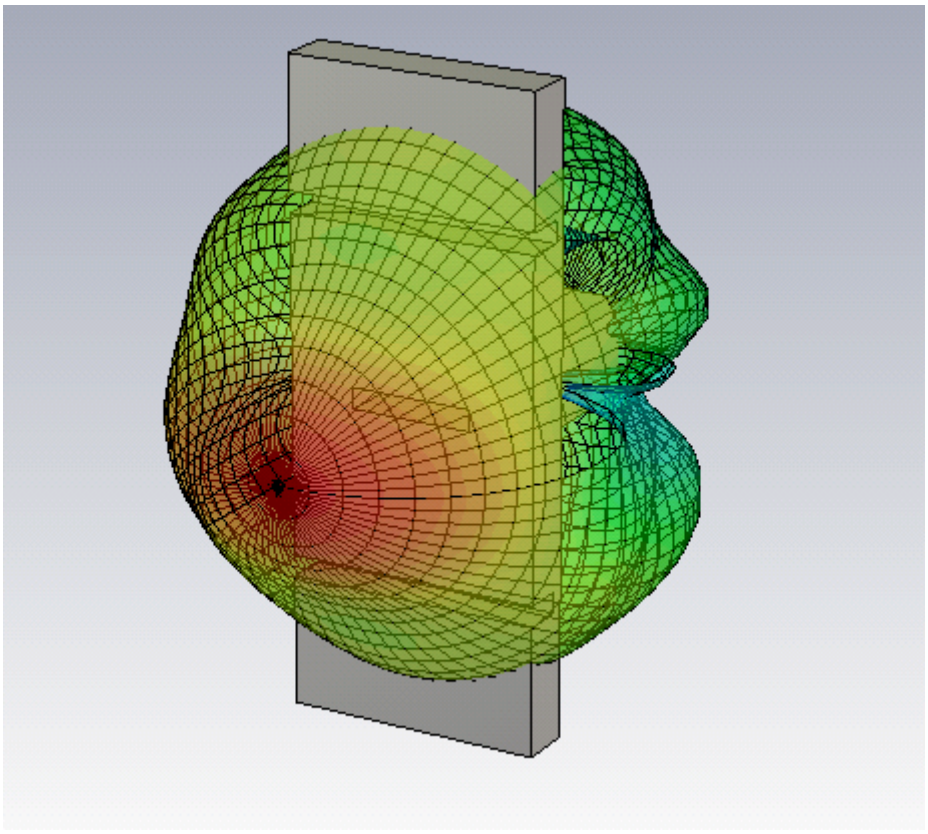
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Planar Horn Antenna

General Description

This example shows the calculation of farfields for a planar horn antenna. The antenna is fed by a rectangular waveguide.



Structure Generation

The structure is modelled only by using basic shapes (bricks) and Boolean operations.

Solver Setup


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Normal background material and open boundary conditions are defined for the correct simulation setup. The chosen units are mm and GHz. A rectangular waveguide port is defined as source. In the solver specials dialog, the direct solver is chosen.

Post-Processing

The resulting farfield is stored in the *Farfields* folder.