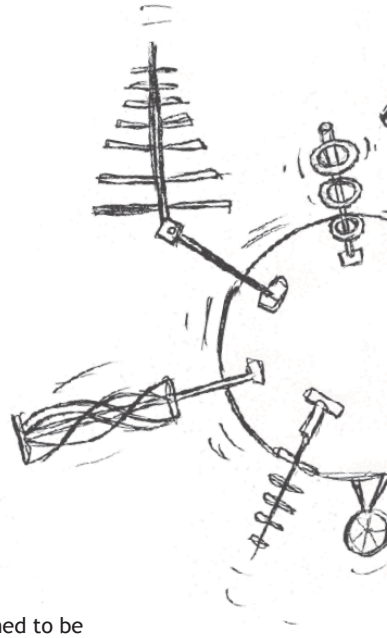


Newsletter 1.6

January 2010

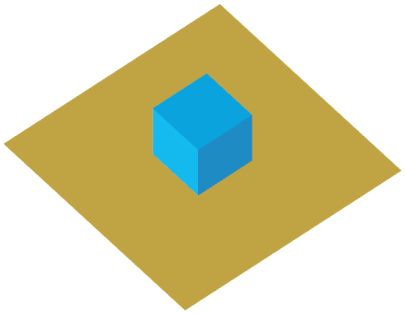
Starting the New Year on a high note!

2010 is going to be an exciting year for Antenna Magus - Version 2.0 is just around the corner and there are so many exciting features and antennas being implemented. This release of Antenna Magus (Version 1.6.0) introduces 6 new antennas and over twenty more performance estimation speedups. For those who missed the announcement in Newsletter 1.5, the speedups were only planned to be released with Version 2.0 but we decided to sneak them into Version 1.6. A total of forty of the antennas have already been reworked and for some antennas the estimated performance is more than hundred times faster!

Six new antennas in version 1.6

An exciting selection of six new antennas has been added in version 1.6. Each of these antennas is very useful and worth taking time to explore.

Dielectric resonator antenna (cubic)



In 1983, M.W. McAllister showed that dielectric slab placed on a ground plane and excited by a pin or probe fed through the ground plane into the dielectric will radiate at its resonant frequency.

This characteristic was employed to introduce a new antenna family: *Dielectric resonator antennas. (DRA's)*. *DRA's* mostly use dielectric materials with high dielectric constants resulting in structures that are small compared to a free-space wavelength and can handle high power over wide temperature ranges.

DRA's may be realised using various resonator shapes (which may be made up of regions with different dielectric properties) and may be excited in various ways (including coupling through an aperture in the ground plane or from a probe located near the dielectric).

This *Cubic DRA antenna* is the first of its class to be included in Antenna Magus and consists of a uniform dielectric cube fed using a short coaxial probe that is embedded in the dielectric. The antenna radiates a linearly polarised, medium gain, single broadside lobe with a peak gain normal to the ground plane. A relatively wide impedance bandwidth can be achieved when compared to other narrowband structures like typical microstrip patch antennas.

Diagonal horn antenna

The *Diagonal horn antenna* is the simplest example of a dual-mode horn antenna and was published in the early 60's. Two spatially orthogonal dominant modes (TE10 and TE01) are excited with equal amplitude and phase in a square waveguide that flares to a 90-degree rotated square aperture. For small flare angles the propagation mode within the horn is aligned with the diagonals, resulting in diagonal polarisation of the aperture field, giving rise to the name 'diagonal horn' .

(continue on the next page)

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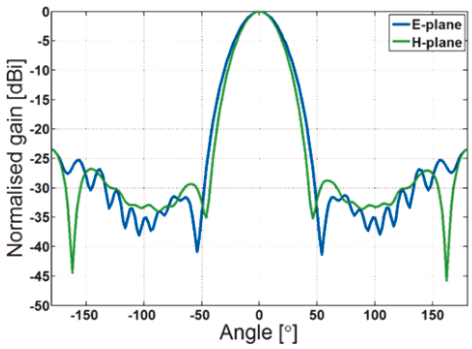
(continued from page 1)

Antenna Magus caters for design at a specific frequency and to achieve a specific gain or beamwidth.

The antenna radiates a linear, dual-linear or circular pattern with good axial symmetry. The radiation pattern of the antenna possesses near-perfect circular symmetry in the principal and secondary planes, as shown in the image below.



Principal plane gain patterns for the *Diagonal horn antenna*.

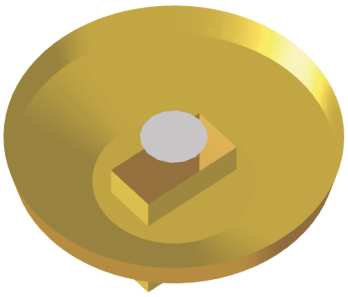
4-arm Sinuous antenna

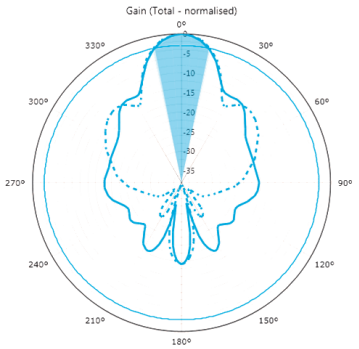
The *4-arm Sinuous antenna* is popular in military and civil applications like radar, direction finding and electronic-counter-measure systems or as a broad-band, polarization-agile feed in measurement systems. As is the case for all antennas in the planar-spiral family, the sinuous provides good broadband characteristics but has the added advantage that it is capable of simultaneously receiving signals of different polarizations in the same aperture with good isolation between the ports. The *Sinuous antenna* is often used in a cavity-backed configuration, though the cavity needs to be absorber-filled to maintain broad-band performance.

Waveguide-fed short backfire

The *Waveguide-fed short backfire antenna* was introduced in the early 70's, a few years after its dipole fed predecessor. The high frequency waveguide-feed enables the antenna to handle higher power levels and higher frequencies.

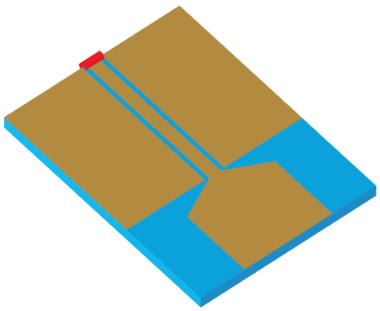
The implementation of this antenna in Antenna Magus uses a pin to excite the waveguide feed which results in a narrowband structure with good impedance matching (though wider band performance is possible using more elaborate feeding and matching structures). The image below shows a typical pattern of the antenna with maximum gain of 15.6 dBi.





Normalised gain of the *Waveguide-fed short backfire*.

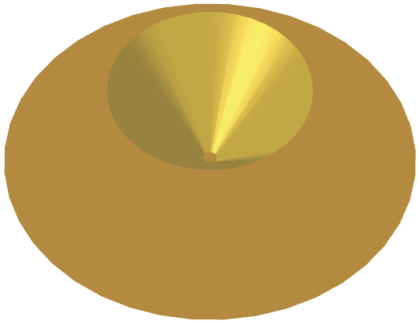
Trapizoidal CPW-fed monopole



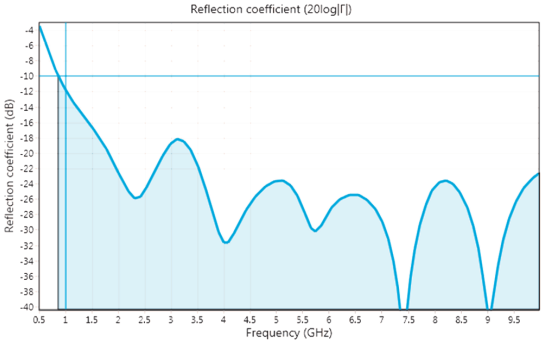
The *Trapizoidal CPW-fed monopole* is a popular ultra-wideband (UWB) antenna used in the FCC 3.1 – 10.6 GHz radio band. Due to its reduced size and wide impedance bandwidth, these printed monopoles are also popular in mobile communications.

The *Trapizoidal monopole* designed by Antenna Magus has a triangular base and a rectangular top section. It is fed using a coplanar waveguide section and provides a reflection coefficient below -8 dB across a 4:1 bandwidth. One advantage of this type of antenna is that it can easily be integrated on the same printed circuit board as the transmitter electronics and requires only one metallisation layer.

Classical monocone



The *Classical monocone* is the second monocone added to the Antenna Magus database. It is an ultra wide band antenna (8:1 typical bandwidth) with +- 2 dBi gain and it is easy to build. The *Classical monocone* can also be designed for frequency and input resistance . The image below shows |S11| for a monocone designed using Antenna Magus to operate from 1 GHz upward.

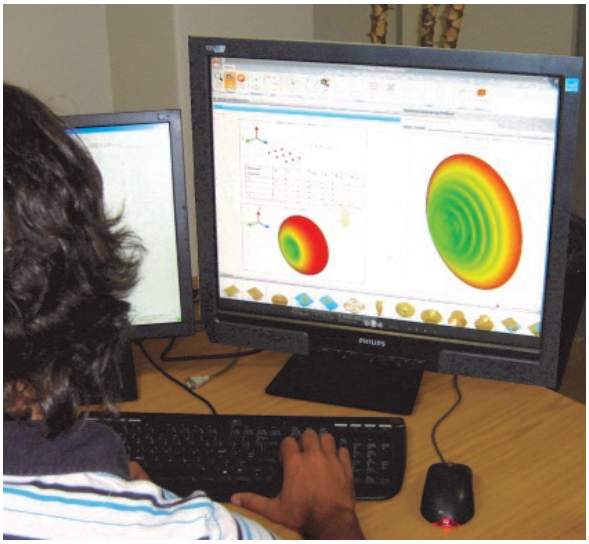


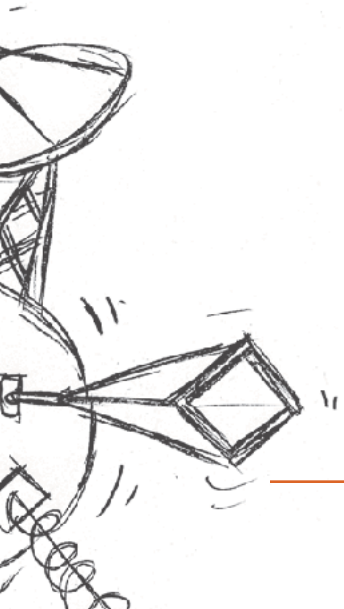
Reflection coefficient of the *Classical monocone* designed with Fmin = 1Ghz.

Antenna Magus 2.0 coming soon...

Everyone at Magus is hard at work rounding off new features that will be made available with the major Version 2.0 release. A number of these features created a lot of excitement amongst internal users and testers when they were implemented. Improvements in the responsiveness and ease-of-use of the application will make working with Antenna Magus Version 2.0 an even more enjoyable experience.

The image below shows one of the developers working on the array synthesis tool – a feature currently planned for Version 2.0 that is sure to be loved by lots of users.





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