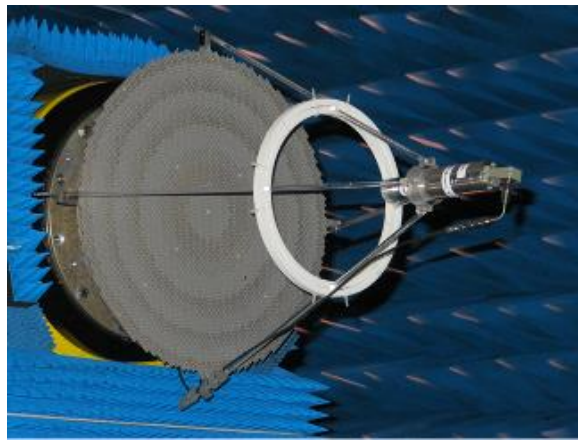# Dual-frequency band passive reflectarray

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Abstract:
This test case concerns the radiation pattern of a dual frequency passive reflectarray antenna.

1 – Definition of the geometry

The passive reflectarray consists of printed concentric rings. A lower square ring works at the upper frequency band and an upper circular ring at the lower frequency band. The two rings are printed on a substrate Neltec NY9220 (ε_r = 2.2, tg δ = 0.0009) with a 17 mm metallization and a thickness of 0.254 mm (Figure 1). The ground plane of the reflector is on the lower face of a NY9220 with a thickness of 0.762 mm. The two substrates are fixed with a speedboard C (ε_r = 2.6, tg δ = 0.004) with a thickness of 38 μm.
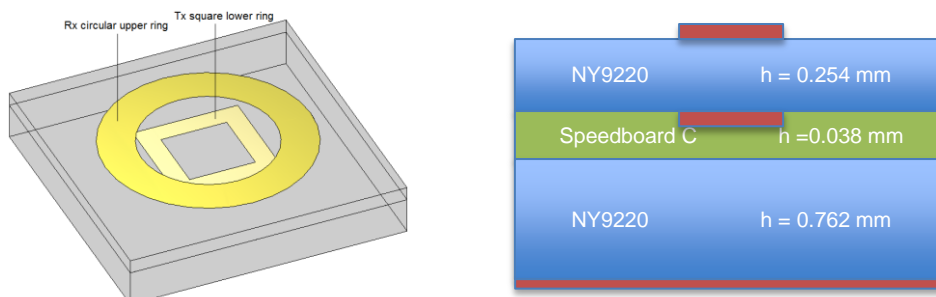

Figure 1: unit cell and substrates configuration

The reflectarray is composed of an assembling of 48 cells (5.4x5.4 mm) in order to compensate dispersion due to the incidence of the field and coupling between the lower and upper ring at the upper frequency band (Figure 2).

An axisymmetrical feed with fundamental mode TE10 (E along x) fed the antenna (Figure 3). The structure has 2 symmetry planes (x0z and y0z).
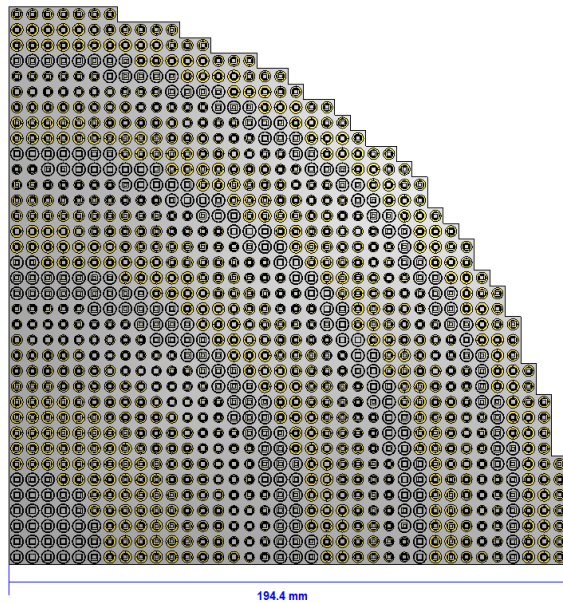
Figure 2: Quarter of the structure and rings configurations   **Figure 3: feed**

The geometry files are available on demand to the chairman. Two possibilities are proposed:
- full CAD files with zero thickness for the metallization of the reflectarray
- files to reconstruct the reflectarray including the description of the circular and rectangular rings for the 48 elementary cells and the assembling of these cells depending their positions for domain decomposition methods and the feed CAD file.

2 – Output results
• Radiation pattern in Gain:
- Frequencies f = 19.7 and 29.7 GHz,
- θ from 0° to 180°, angular step 0.1°,
- In Eplane (OX) and Hplane (OY),
- In the two polarizations ($E\theta$ and $E\phi$).

3-Diagram formats
The results must be supplied in two ASCII files with 5 columns:
- θ (degrees), Gain_ $E\theta$_Eplane (dB), Phase_ $E\theta$_Eplane (°), Gain_ $E\phi$_Hplane (dB), Phase_ $E\phi$_Hplane (°)

With the following suggestions for the name of the ASCII file:
- Reflectarray_1970_Contributorname
- Reflectarray_2970_Contributorname