

Test case 5: RCS of an array antenna under a nose cone radome

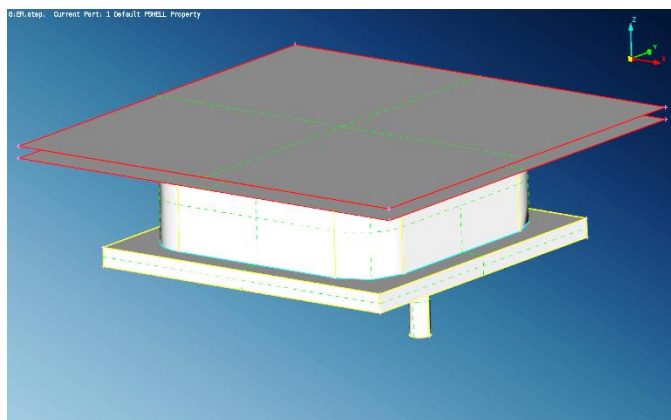
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Geometry

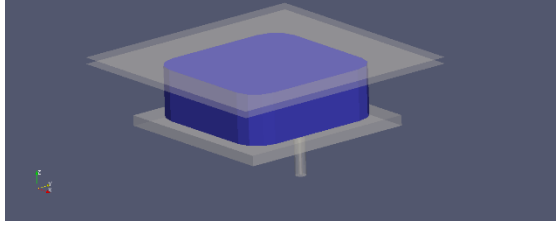
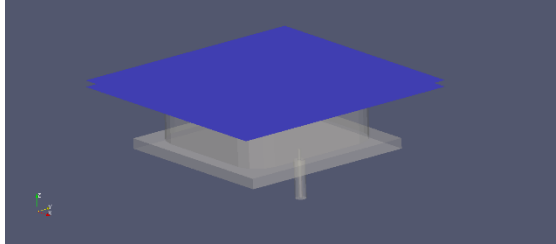
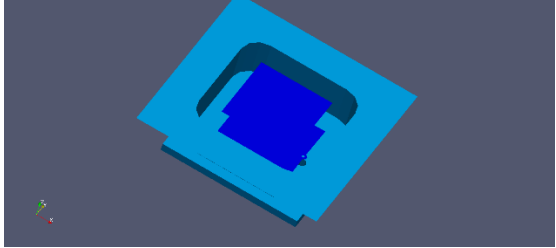
The CAD files exist and are provided upon request to the chairman.

Unit cell

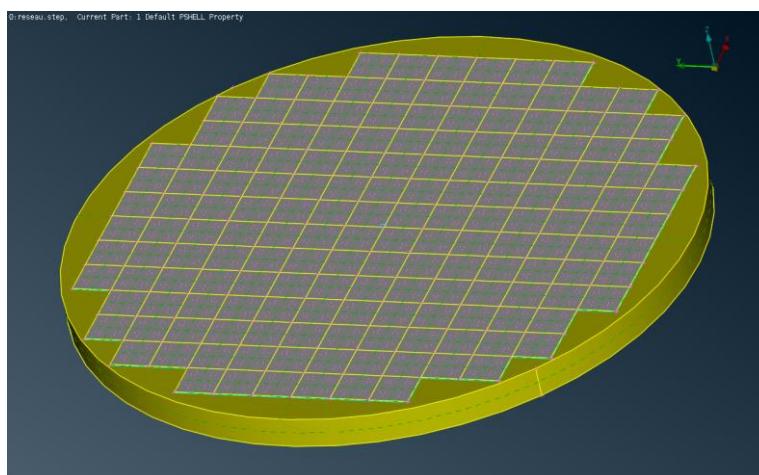


The unit cell consists in a metal patch excited by a pin. The dielectric characteristics of the materials are given hereafter:

<p>A 3D CAD model of a unit cell showing a dielectric substrate with a metal patch on top, excited by a pin. The substrate is semi-transparent to show the internal structure.</p>	<pre> epsilon : 2.000000 tangent delta: 0.0000000E+00 mu : 1.000000 tangent mu : 0.0000000E+00 </pre>
<p>A 3D CAD model of a unit cell showing a dielectric substrate with a metal patch on top, excited by a pin. The substrate is semi-transparent to show the internal structure.</p>	<pre> epsilon : 3.550000 tangent delta: 2.7000003E-03 mu : 1.000000 tangent mu : 0.0000000E+00 </pre>

	<pre> epsilon : 1.000000 tangent delta: 0.0000000E+00 mu : 1.000000 tangente mu : 0.0000000E+00 </pre>
	<pre> epsilon : 3.550000 tangent delta: 2.7000003E-03 mu : 1.000000 tangente mu : 0.0000000E+00 </pre>
	<p>Metallic parts Dark blue= metallic sheet without thickness</p>

Array

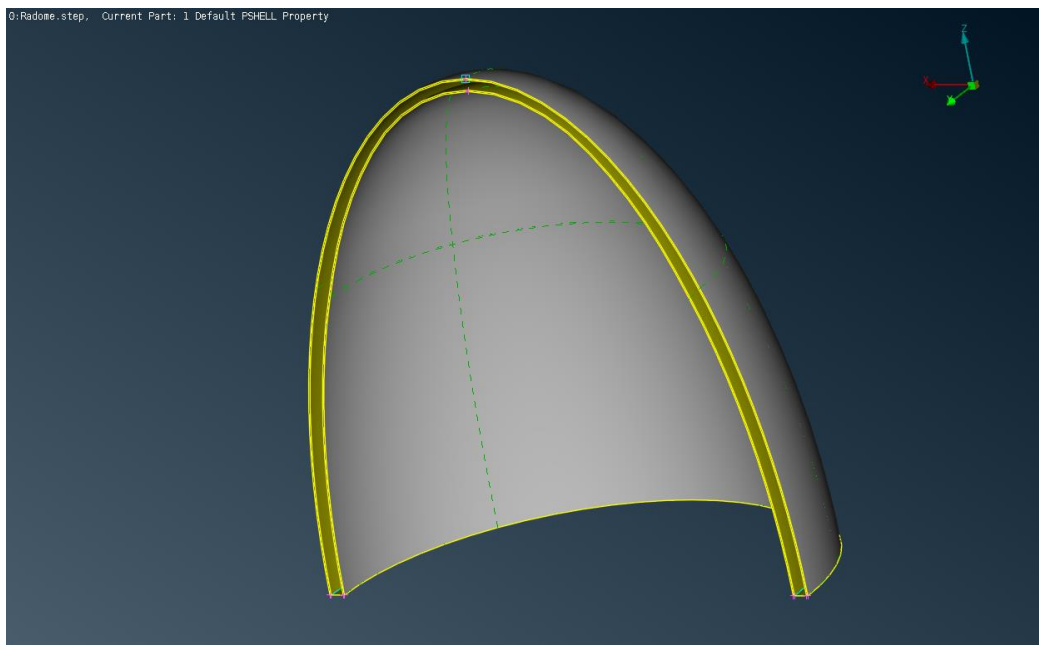


The array is made up of 164 unit cells arranged in a square lattice, as shown above. The closing condition is a PEC plate.

Metal plate

It consists in the ground plane of the array antenna.

Nose cone radome



It is a 3-layer structure, with the following material characteristics:

- Outer layer: epsilon= 3.5, tg delta= 0.01, thickness= 1 mm.
- Spacer: epsilon= 1.1, tg delta= 0.001, variable thickness
- Inner layer: epsilon= 3.5, tg delta= 0.01, thickness= 1 mm.

It is a body of revolution.

Test case setup

Frequency

6 GHz, 8.75 GHz, 9.75 GHz

Incident plane waves

3 planes and 2 polarisations (E along \hat{u}_θ and \hat{u}_ϕ)

$\phi=0^\circ$ (plane xOz), $\phi = 90^\circ$ and $\phi = 45^\circ$.

$\theta=0^\circ$ to 90° by steps of 0.1°

NB: (θ, ϕ) are taken according to the [common ISO definition](#) ; the time harmonic convention is $e^{-j\omega t}$.

Sub test case #A

It consists in the radome and the metal plate.

Sub test case #B

It consists in the radome and the array antenna with matched loads on all the waveports.



Results

Monostatic RCS

One file per test case.

Input files

List of .stp files.