

test case 3:
Antennas Insulation using High Impedance Surface

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Abstract:

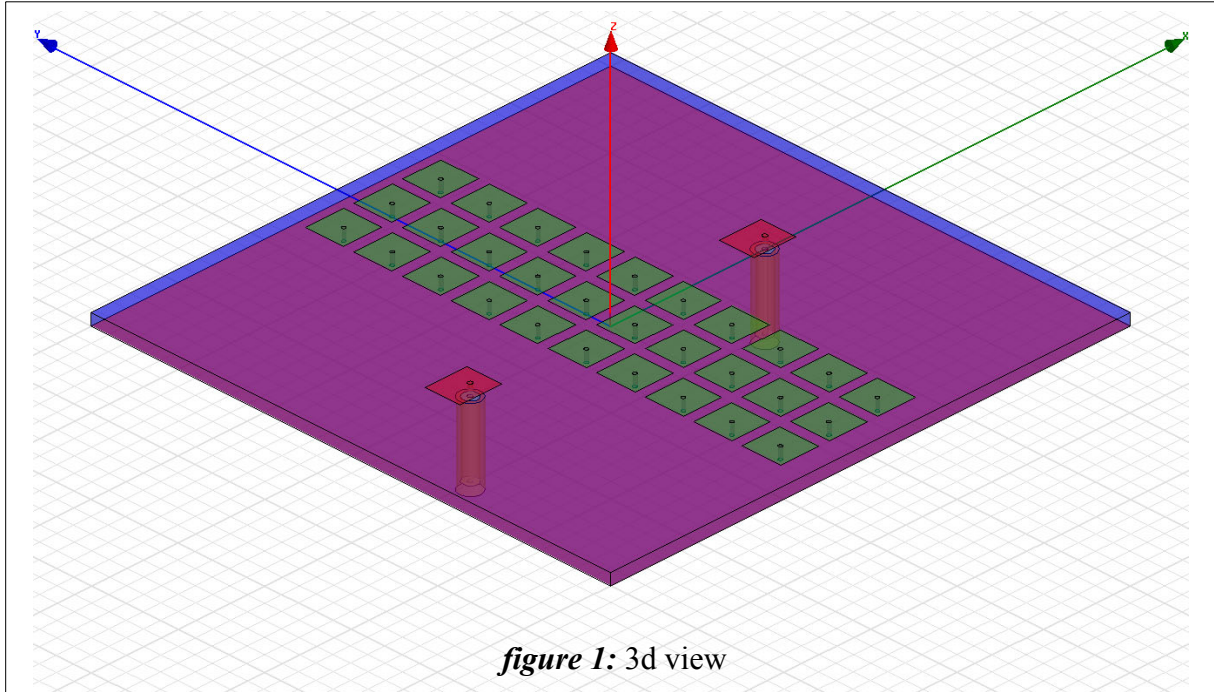
The objective is to evaluate the use of a High Impedance Surface on the mutual coupling between two printed patches. The HIS is composed by an array of mushroom cells inserted between the two patches. Two cases without and with the HIS must be simulated.

The results (short description of the numerical method(s), the plots and the ASCII files) must be sending to the scientific secretaries of the workshop before October 15, 2010.

* IGES file available (with thin metalisation).

Geometry:

The geometry is composed by 2 rectangular patches spaced by 85 mm and separated by an High Impedance Surface realized by an array of 10x3 mushroom cells (see figure 1).



Dimensions (see figure 2):

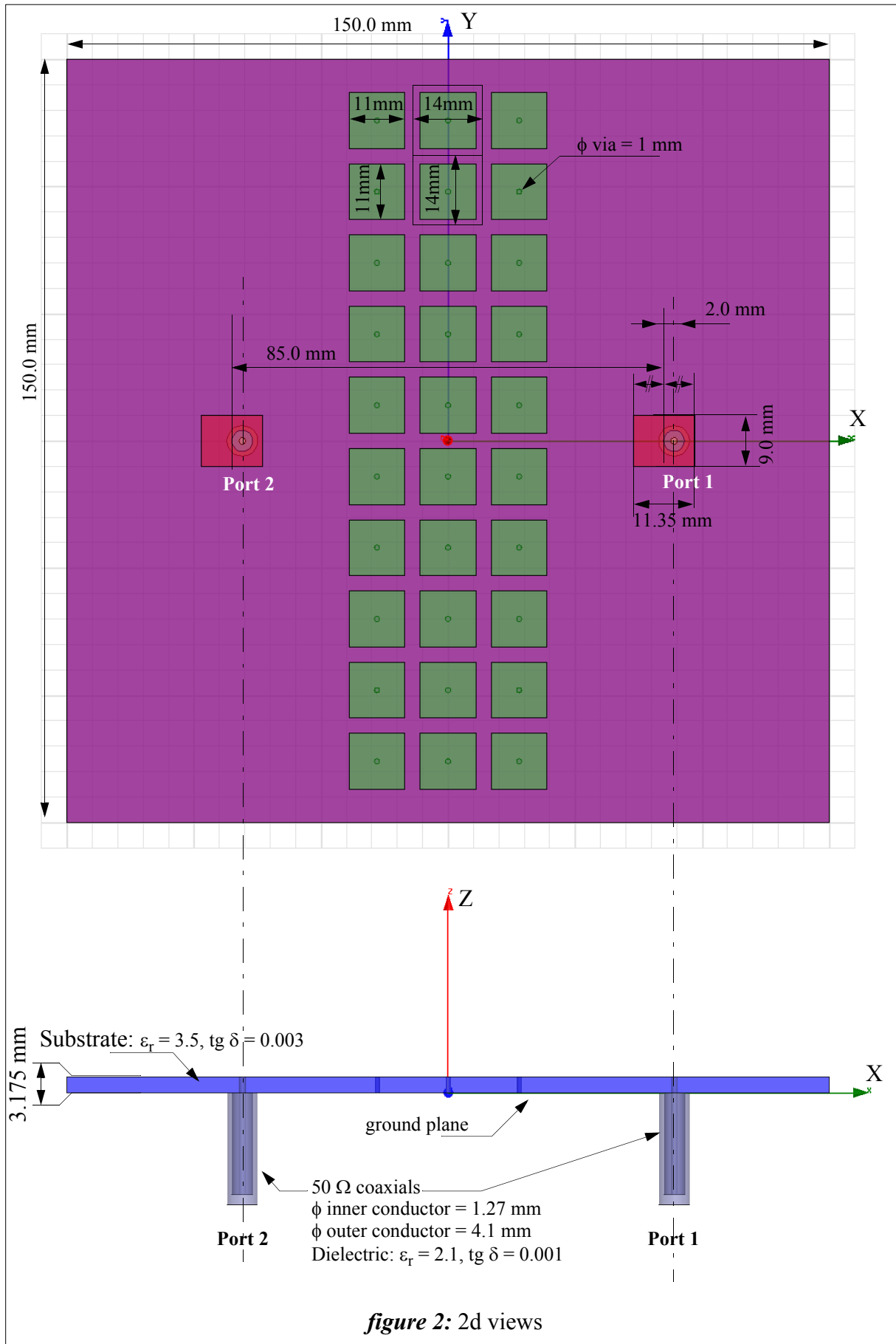
The patch size is 11.35 x 9.0 mm. The feeding point is shifted by 2 mm from the center.

The HIS cell size is 14x14 mm. The patch has a size of 11x11 mm with a central post diameter of 1 mm.

The substrate is 3.175 mm high with dielectric constant $\epsilon_r = 3.5$ and $\text{tg } \delta = 0.003$. The metallisation thickness is 17 μm .

The patches are fed by coaxial waveguides.

The ground plane and dielectric substrate have finite dimensions 150.0 x 150.0 mm.



Frequency domain results:

The working frequency band is 5.5 GHz to 6.5 GHz.

The phase convention is $e^{+j\omega t}$.

Expected results:

In order to evaluate the HIS use on the mutual coupling between the 2 patches, two cases must be simulated: without and with HIS.

For port 1 fed and port 2 loaded.

S matrix:

- S matrix from 5.5 to 6.5 GHz with at least a 0.05 GHz step.

Radiation pattern at 6.0 GHz:

- Eplane (XoZ plane) in gain (including insertion losses) from -180° to 180° every 1° .

Ascii file formats:

The results must be provided in ASCII files with the file names:

- test3_namesoftheauthors_Smatrix.dat with 5 rows:
(freq, (S₁₁(dB), S₂₁(dB)) without HIS, (S₁₁(dB), S₂₁(dB)) with HIS).
- test3_namesoftheauthors_Eplane.dat with 3 rows:
(theta(°), Gain(dB) without HIS, Gain(dB) with HIS).