TEST CASE 6: Metallic cavity filled with PVC

Monostatic RCS and ISAR images

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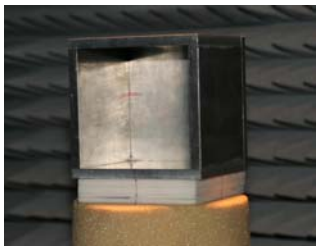
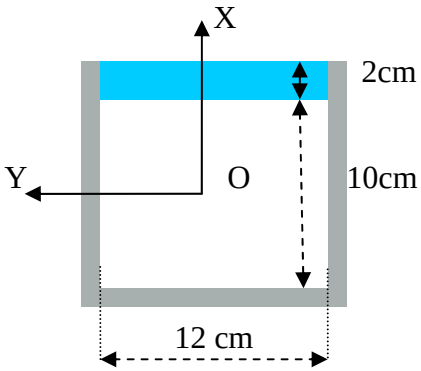
1. *Definition of the Geometry*

The target is a metallic cavity filled with a PVC Plate (2cm)):

- Thickness of plates: 1 cm
- Internal dimensions: 10x12x12 cm
- PVC Plate = 2cm





The centre of the interior cube and the phase centre are assumed to be located at $(x,y,z) = (0,0,0)$.

2. *Simulation Parameters*

The time dependency is assumed to be exp(jωt).

The object described above shall be studied at the frequency $f = 30$ GHz. At this frequency, the relative permittivity of the material is approximately $\varepsilon_r = 2.7$. For all simulations, $\varepsilon_r = 2.7 - j\,0.02$ shall be assumed.

2.1. Case (a): Monostatic RCS of the target

The monostatic RCS shall be simulated at the frequency $f = 30$ GHz in the azimuth plane ($z = 0$, $\phi = 0°\ldots180°$, $\Delta\phi = 0.5°$) for both vertical polarisation ($\theta\theta$-polarisation, i.e. **E** perpendicular to the *xy*-plane) and horizontal polarisation ($\phi\phi$-polarisation, i.e. **E** field in the *xy*-plane).

2.2. Case (b): ISAR image

For the target described above, the RCS shall be simulated in the frequency range from 25 to 35 GHz with $\Delta f = 100$ MHz (i.e. 101 frequencies) for the azimuth angles $\phi = 0°\ldots180°$, $\Delta\phi = 0.5°$ for both polarisations ($\theta\theta$-polarisation and $\phi\phi$-polarisation). Due to the symmetry of the object, a full ISAR image can be generated from these data.

3. *Data Formats*

The results will be stored in one ASCII file for Case (a) and one ASCII file for Case (b).

3.1. Case (a) :

The file will contain on each row the data :

ϕ , $\sigma_{\theta\theta}$, $\sigma_{\phi\phi}$

where ϕ is the angle in degrees, $\sigma_{\theta\theta}$ and $\sigma_{\phi\phi}$ are the RCS in dBsm in $\theta\theta$-polarisation and $\phi\phi$-polarisation.

3.2. Case (b) :

The file will contain:

f, ϕ, *Real*($E_{\theta\theta}$), *Imag*($E_{\theta\theta}$), *Real*($E_{\phi\phi}$), *Imag*($E_{\phi\phi}$)

where *f* is the frequency in GHz, ϕ is the angle in degrees, *Real*($E_{\theta\theta}$), *Imag*($E_{\theta\theta}$),*Real*($E_{\phi\phi}$), *Imag*($E_{\phi\phi}$) are the real and imaginary parts of the scattered field strengths in $\theta\theta$-polarisation and $\phi\phi$-polarisation.