

WORKSHOP ISAE 2016

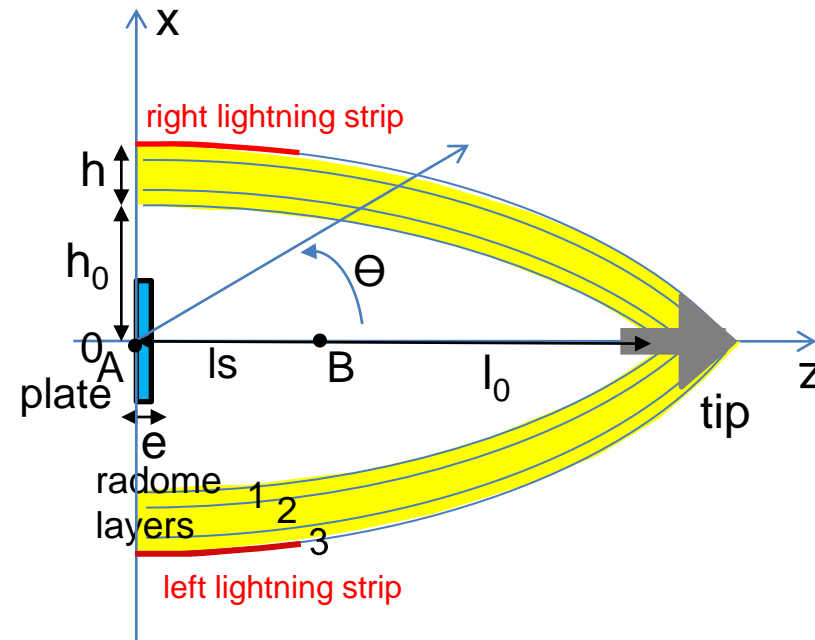
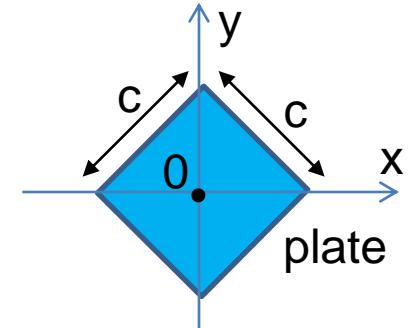
TEST CASE 2: Diamond Plate under Radome

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Definition of the geometry :

- Plate: square and perfectly conducting, side length $c=300\text{mm}$, thickness $=10\text{mm}$, diamond position (xy-plane)
- Radome: circular ogive layers
 - Obtained by revolving concentric arcs of circles around the z-axis
 - Position of the center (Fig. page 4) : $(x=-1495\text{mm}, y=0\text{mm}, z=-0\text{mm})$
 - Inner radius of the radome in the plane $z=0$: $h_0=250\text{mm}$
 - Depth: $l_0=900\text{mm}$
 - Total thickness: $h=10\text{mm}$
 - Inner/outer layers: $\epsilon_1 = \epsilon_3 = 3.5 - j0.0035$; $h_1 = h_3 = 1\text{mm}$
 - Middle layer : $\epsilon_2 = 1.15 - j0.001$; $h_2 = 8\text{mm}$
- Metallic lightning strips: drawn in the yz-plane and symmetrically projected on the outer side of the radome
 - Length $l_s=300\text{mm}$ in the yz-plane, width $w_s=3\text{mm}$, without thickness
 - Symmetrical along the z-axis
 - Extreme points : $A(0, -1.5, 0)$ and $B(0, 1.5, 300)$
- Metallic cylindrical/conical tip
 - Obtained by revolving the profile given in Fig. page 5
 - Made up of a cylindrical part and a pseudo-conical part
 - Cylinder radius $r_c=5\text{mm}$, length $l_c=20\text{mm}$
 - Pseudo-conical tip:
 - Radius of the basis $h_t=20\text{mm}$
 - Outer profile: arc of circle coincident with the outer radome layer
 - Can be approximated by a cone of length $l_t=33,42\text{mm}$



Diamond Plate under Radome

Frequency and angular definitions :

- $F=10\text{GHz}$,
- Φ azimuth angle (x,y plane)
- Θ elevation angle (x,z plane)
- polarizations $\phi\phi$ and $\Theta\Theta$
- $\Theta \in [0^\circ ; 90^\circ]$ step 0.2° ; $\phi=0^\circ$

4 Subtest cases : monostatic RCS

- 2a) only plate
- 2b) plate with radome
- 2c) plate with radome and tip
- 2d) plate with radome and tip and strips

Outputs : 3 ASCII files with 5 columns (Θ , amplitude($E_{\text{far}} \phi\phi$), phase($E_{\text{far}} \phi\phi$), amplitude($E_{\text{far}} \Theta\Theta$), phase($E_{\text{far}} \Theta\Theta$)), with angles given in degrees

- $E_{\text{far}_2b}(\Theta) - E_{\text{far}_2a}(\Theta)$ with filename cas2b-2a.txt
- $E_{\text{far}_2c}(\Theta) - E_{\text{far}_2b}(\Theta)$ with filename cas2c-2b.txt
- $E_{\text{far}_2d}(\Theta) - E_{\text{far}_2c}(\Theta)$ with filename cas2d-2c.txt

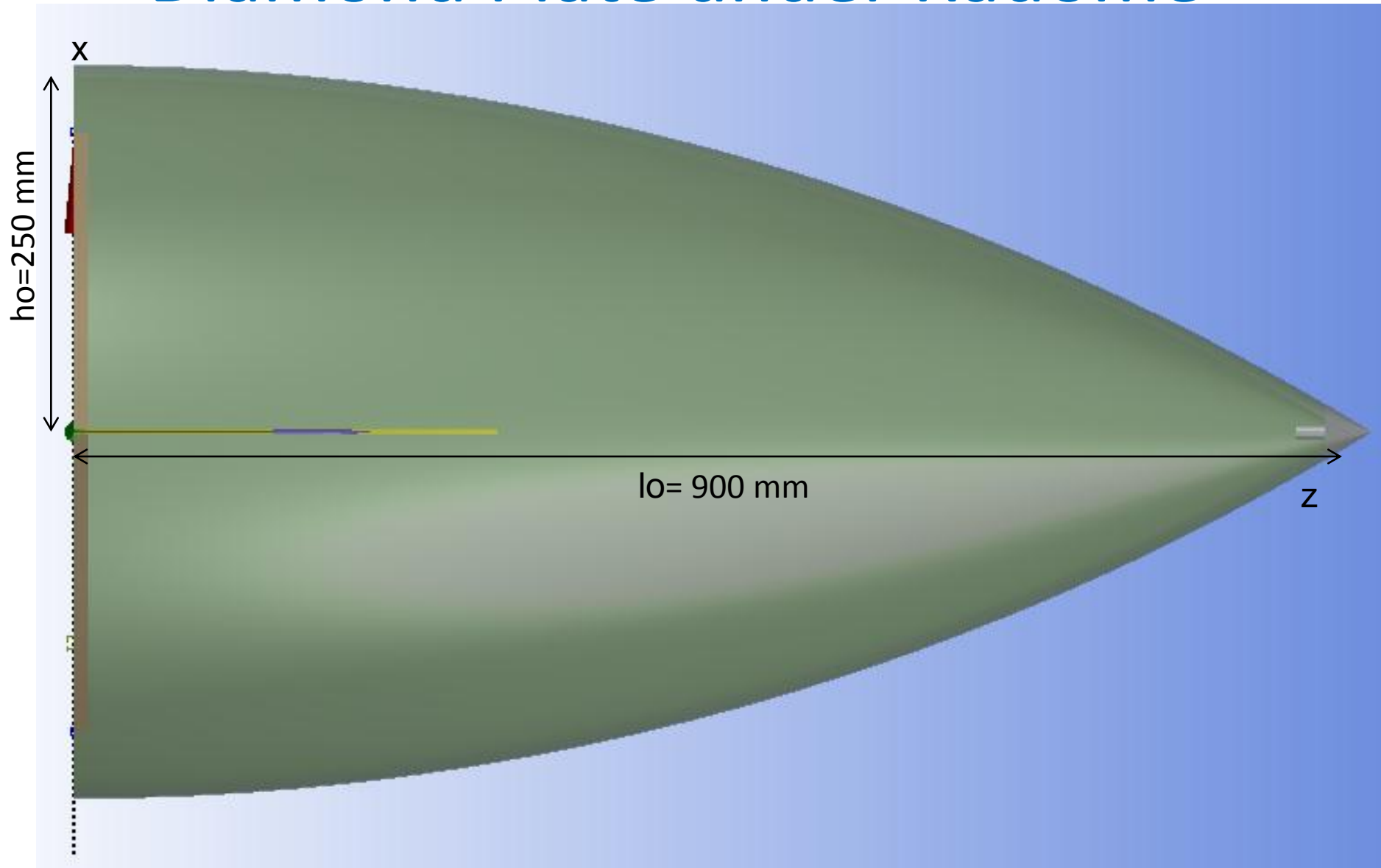
The RCS will be processed from these results by the chairmen.

CAD file : geometrical files under the STEP or IGES format is available

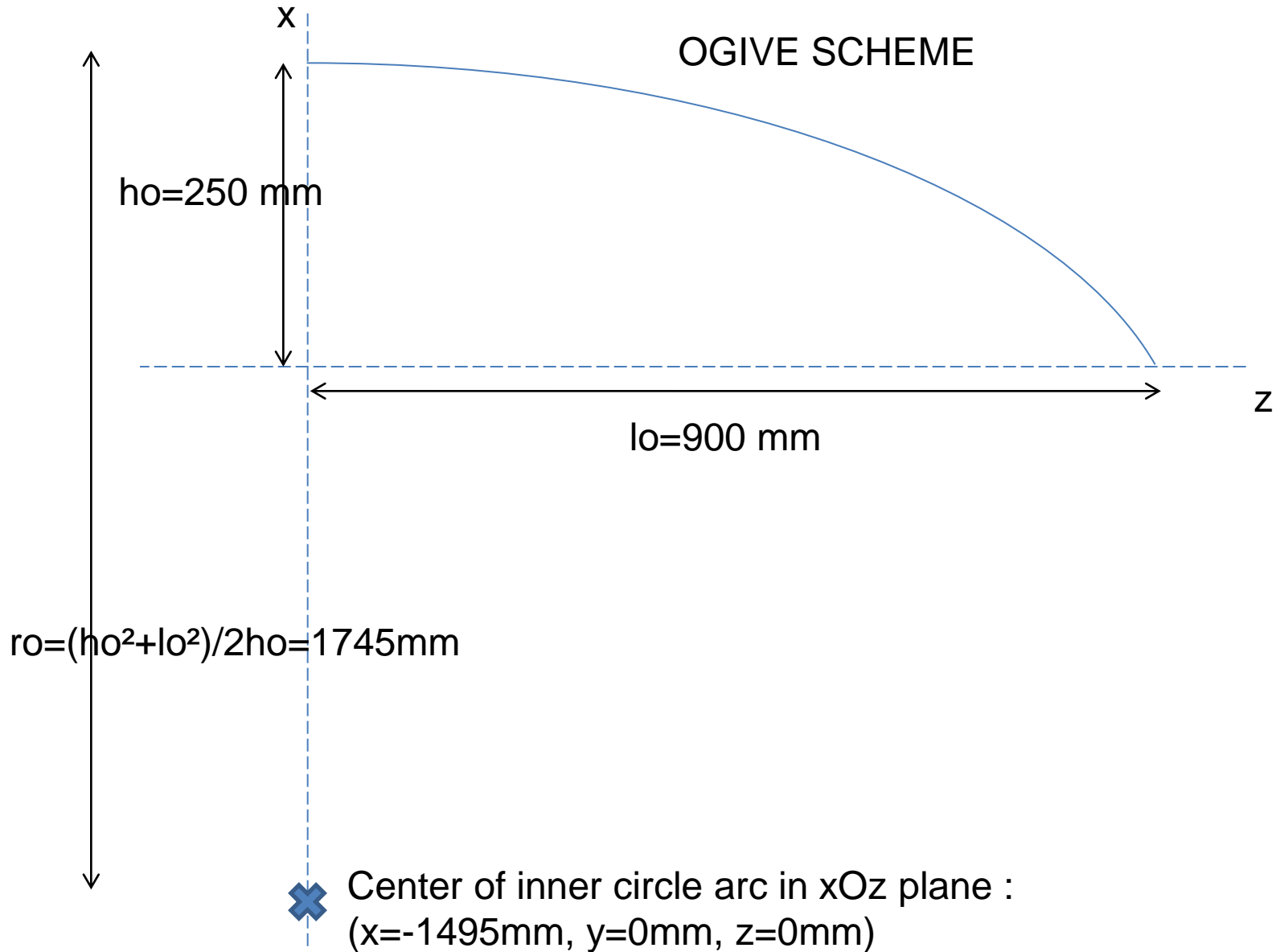
Useful precision

- The CAD consists in 5 volume bodies
 - 3 radome layers
 - The tip
 - The plate
- Both the two external radome layers are imprinted with the lightning strips
 - They are faces of the volume bodies.
 - Only the outermost one is metalized (without thickness)
- The radome does not show any hole for the metallic tip
 - Case 2b: the metallic tip is not present; there is no hole at the extremity of the radome
 - Case 2c: a subtract operation between the layers and the tip must be done to create the hole in the radome
- Outputs: **new requests** for it is the RCS of the far-field difference that has to be computed, and not the difference of the RCS.

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