DE LA RECHERCHE À L'INDUSTRIE

Workshop ISAE 2023 – Test case proposal

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Emanuele Arcese, Pierre Bonnemason, Matthieu Lecouvez

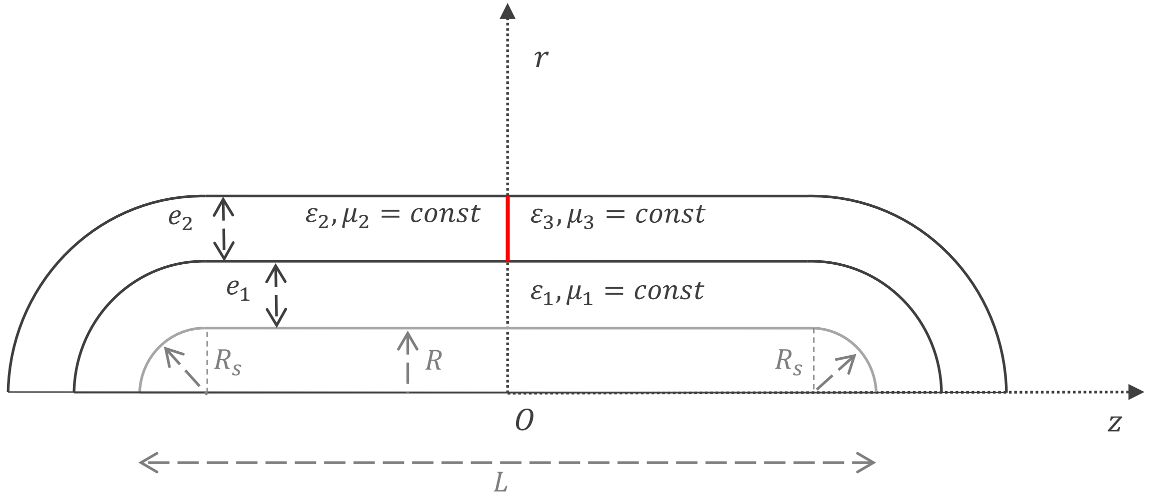
- **Geometry of the case**

The geometry is axisymmetric, with $\overline{Oz}$ the rotation axis. It consists of a PEC sphere-cylinder-sphere covered by two piece-wise homogeneous-medium layers of constant thicknesses: the inner layer, of thickness $e_1 = \cdots$, is made of a homogenous medium, with relative parameters $\varepsilon_1 = \ \dots, \mu_1 = \ \dots$; the outer layer, of thickness $e_2 = \ \dots$, is filled by two adjacent homogeneous media, one located on the left side of the r-axis, with $\varepsilon_2 = \ \dots, \mu_2 = \ \dots$, and the other one on the right side of the r-axis, with $\varepsilon_3 = \ \dots, \mu_3 = \ \dots$.

- **Three configurations will be studied**

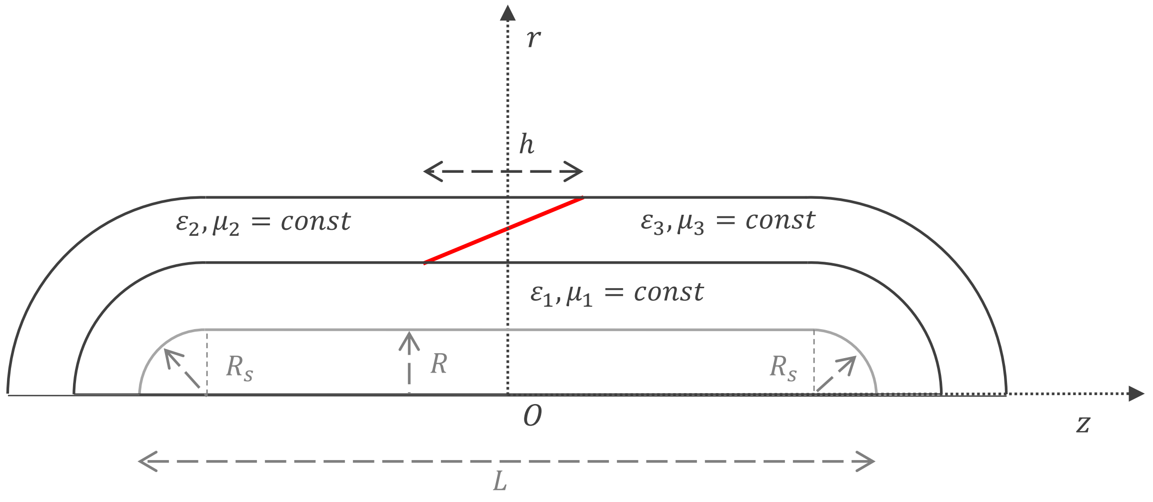
1. Abrupt change in relative permittivity/permeability of the two media within the outer layer;
2. Geometrical gradient between the two homogenous media, occurring over a distance of $h = \ \dots$;
3. Smooth transition in relative permittivity/permeability of the two media, occurring over a distance $h = \ \dots$.

- **Configuration #1 :** Abrupt change (the red location) in relative permittivity/permeability of the two media within the outer layer;

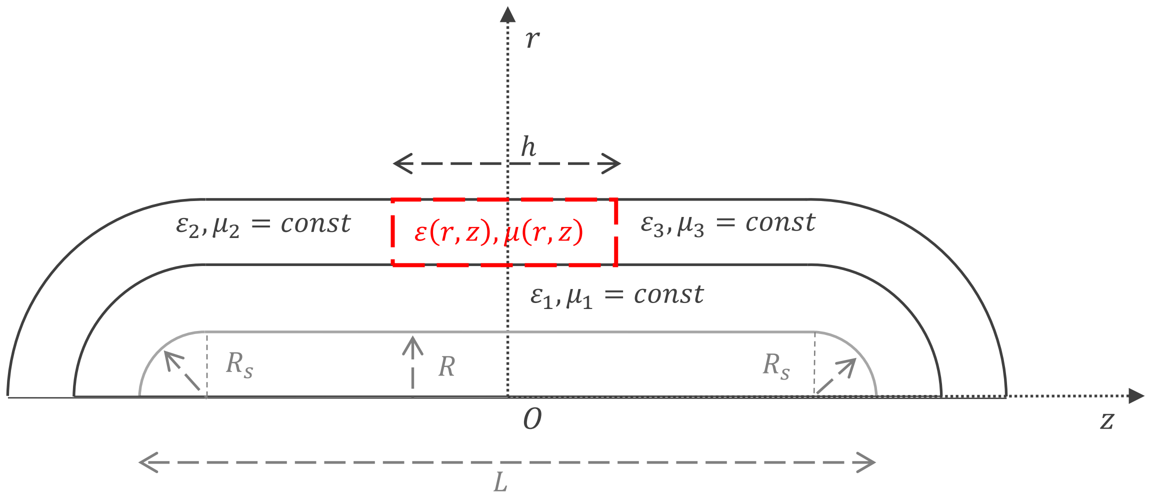


Test case: composite capsule-like structure

- **Configuration #2 :** Geometrical gradient (the red transition) between the two homogenous media, occurring over a distance of $h =$ ...;



1. **Configuration #3 :** Smooth transition (the red area) in relative permittivity/permeability of the two media, occurring over a distance $h =$ ... .

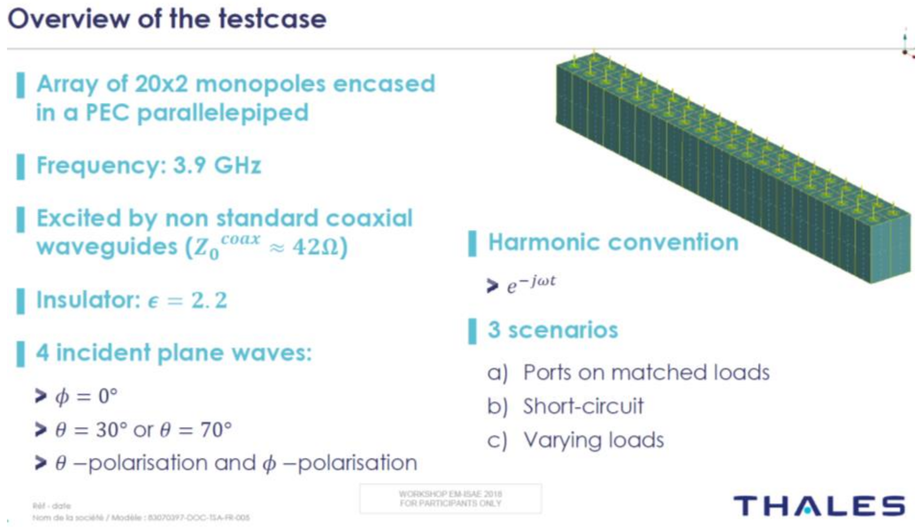


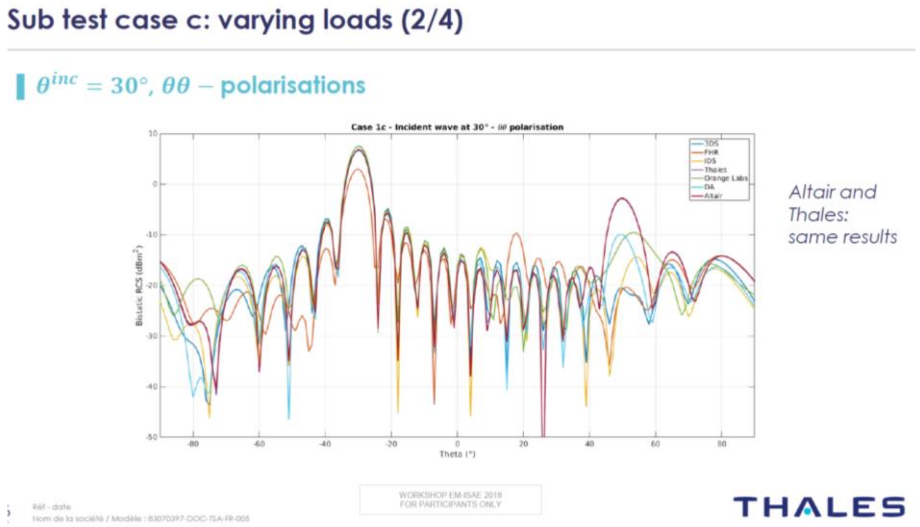
- **Results to be provided**

We are seeking the monostatic $RCS(\theta,\phi)$ for :

- $(\theta,\phi) = (0°, 0°)$ in the standard spherical coordinate system,
- wave frequency ranging from 4 GHz to 6 GHz, with $\Delta\mathrm{F} = ??$ (i.e. # frequencies)
- $\theta\theta$ - and $\phi\phi$ - polarization .

- **2018 THALES test case**





- **Large variability in the results**
- **Extend the test case: instead of providing the varying loads, we ask to optimize them in order to**
  - Maximize the bistatic RCS at one angle (e.g. 30°)
  - Maximize the minimum of the bistatic RCS on an angular band (e.g. [20°, 30°])

Results to be provided

- **The complex loads for each port**
  - RCS will be recomputed with these loads by the chairman and co-chairman
- **The RCS as computed by the participant**

Thank you