# Model Construction

For this example, we do not need a project template. We simply launch CST EM STUDIO.

The parameters are defined as shown in Table 1.

**Table 1: Parameter list of the quarter-wave transformer**

| Parameter | Value | Description |
|---|---|---|
| R0 | 1 m | PEC sphere radius |
| distance | 5 m | Separation of sphere midpoints |
| U | 1 V | Potential between spheres |

Define the first sphere, with a radius of R0 centered at the point (distance/2,0,0), with PEC material, as shown in Fig. 6. Around this, define a second sphere, with a radius of R0+0.1, also centered at the point (distance/2,0,0), with air material. Because these objects intersect, a dialog will appear asking how this intersection should be handled. Ensure the vacuum sphere is highlighted, and select “Trim highlighted shape”.

Repeat this process for the second sphere, which should be centered at the point (-distance/2,0,0). The model should appear as shown in Fig. 7.

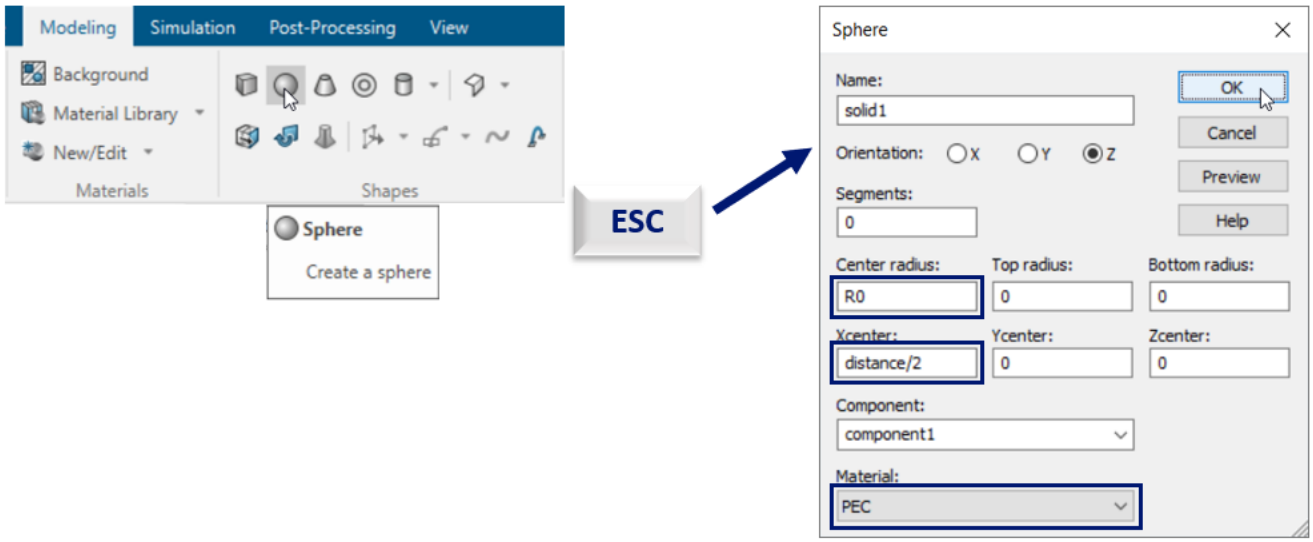


**Figure 6**: Sphere definition dialog for the first PEC sphere

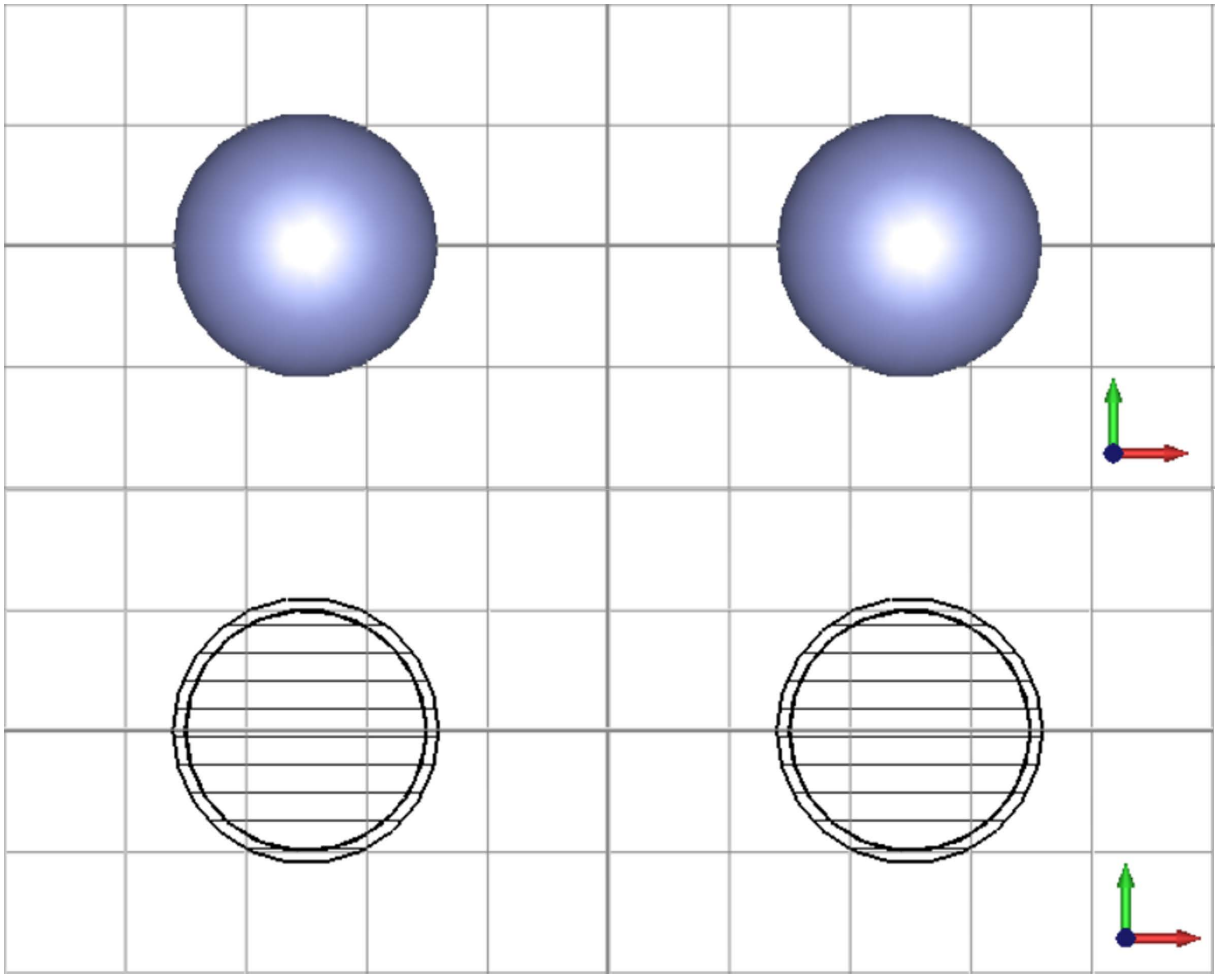

**Figure 7**: The sphere models, seen in 3D view (top) and in 2D using a cutplane (bottom).

Next, define the potentials, using the “Electric Potential” tool on the Simulation menu. To one sphere, define a potential of U/2 V, and to the other, a potential of –U/2 V, as shown in Fig. 8.

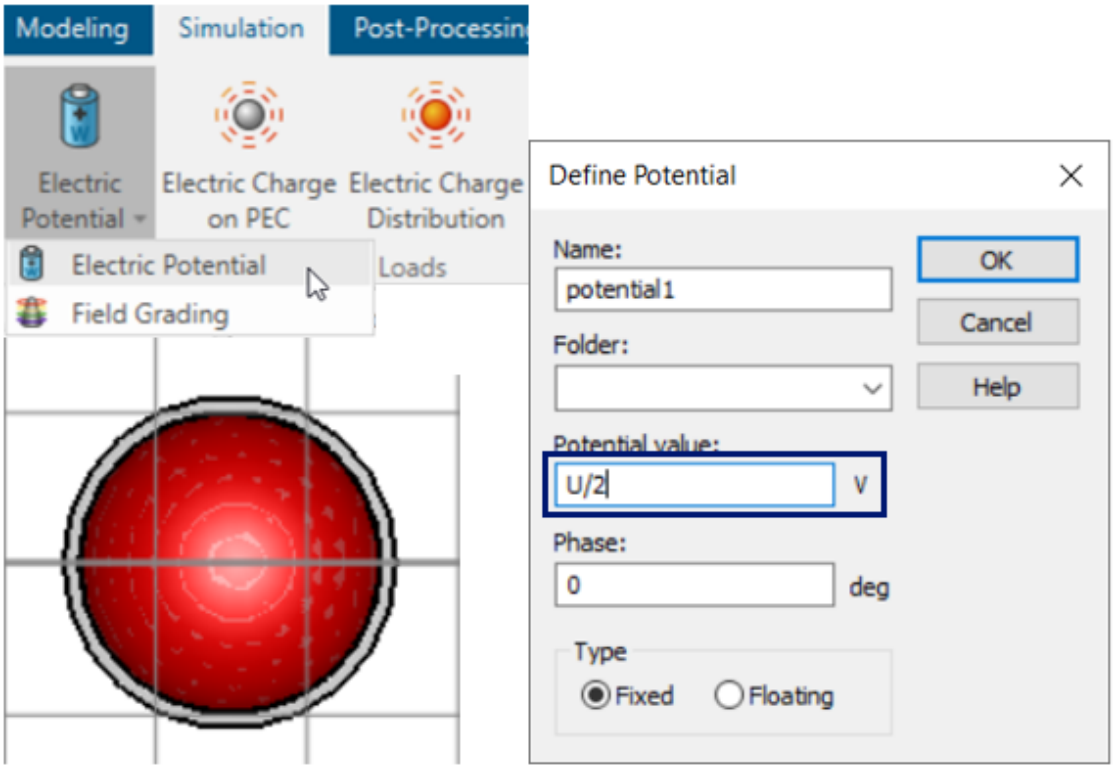


**Figure 8**: Potential definition dialog for the first PEC sphere.

Set background to normal and add 1.5 m of space, as shown in Fig. 9.

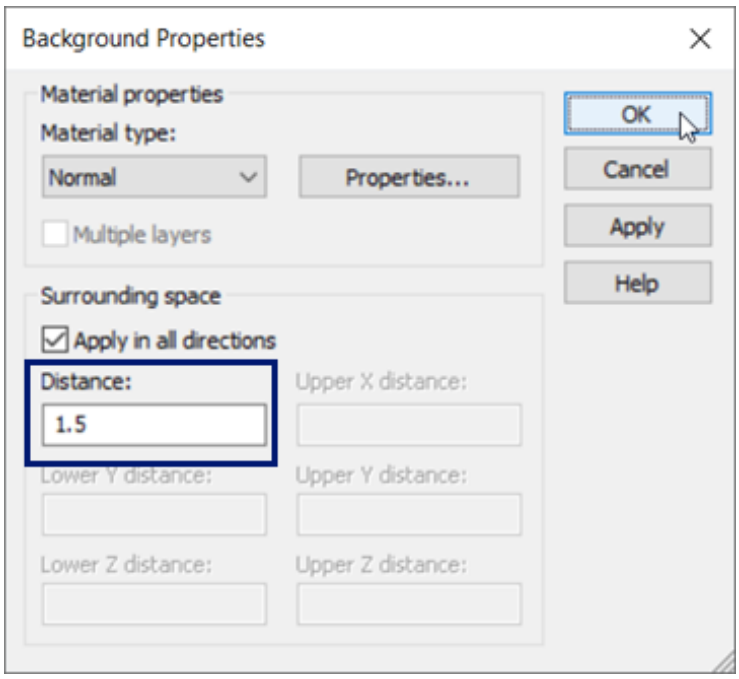


**Figure 9**: Background Properties dialog

The boundaries should be all “Open” and the symmetry planes should be “Electric” in the YZ plane and “Magnetic” in the XZ and XY planes (Fig. 10)

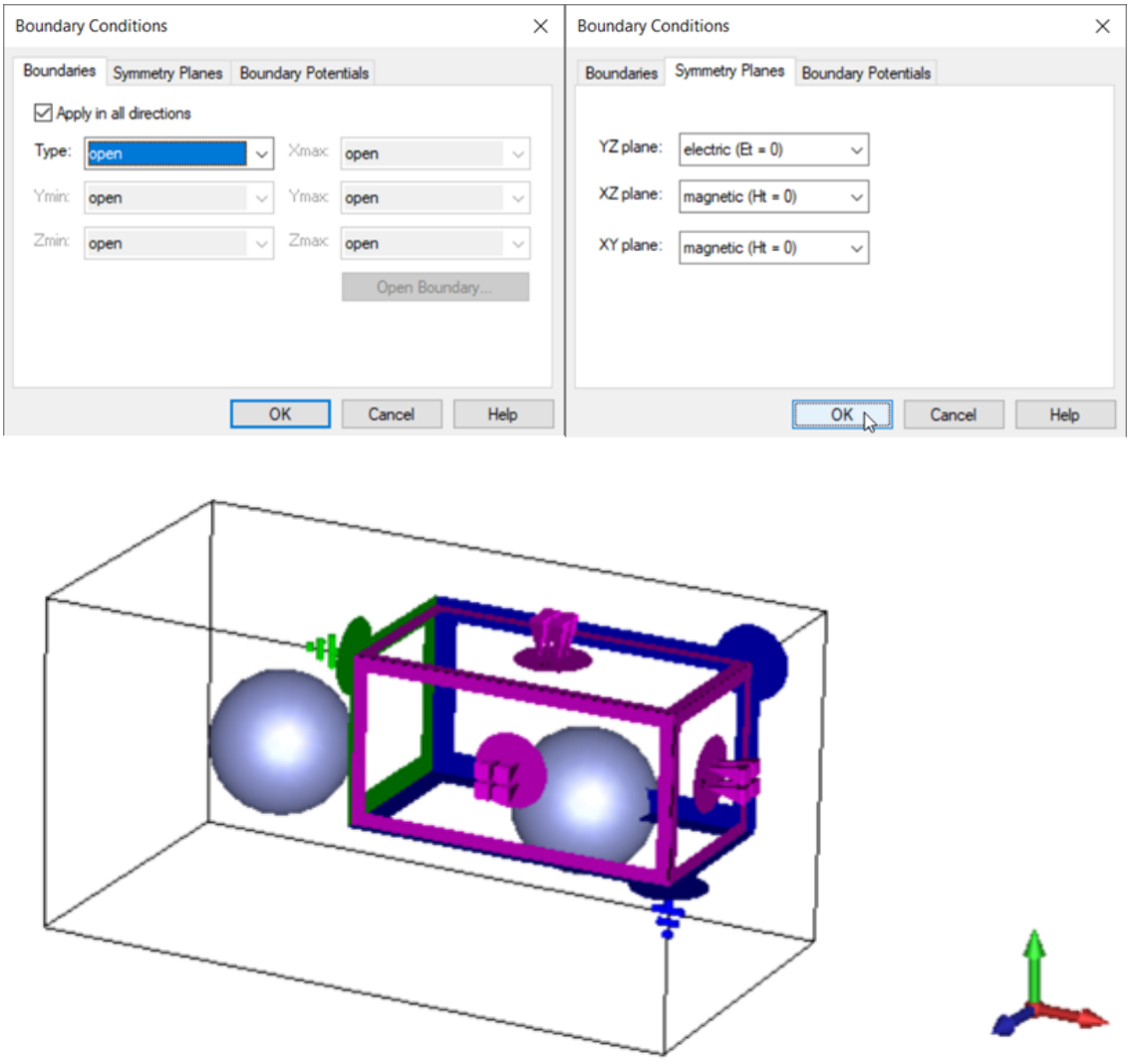


**Figure 10**: The boundary conditions and symmetry planes of the simulation.

To show the field gradients accurate, we want a fine mesh. For this, we select “Mesh Properties” on the Simulation ribbon and set the number of cells per max model box edge to 60 in the model and 12 in the background.

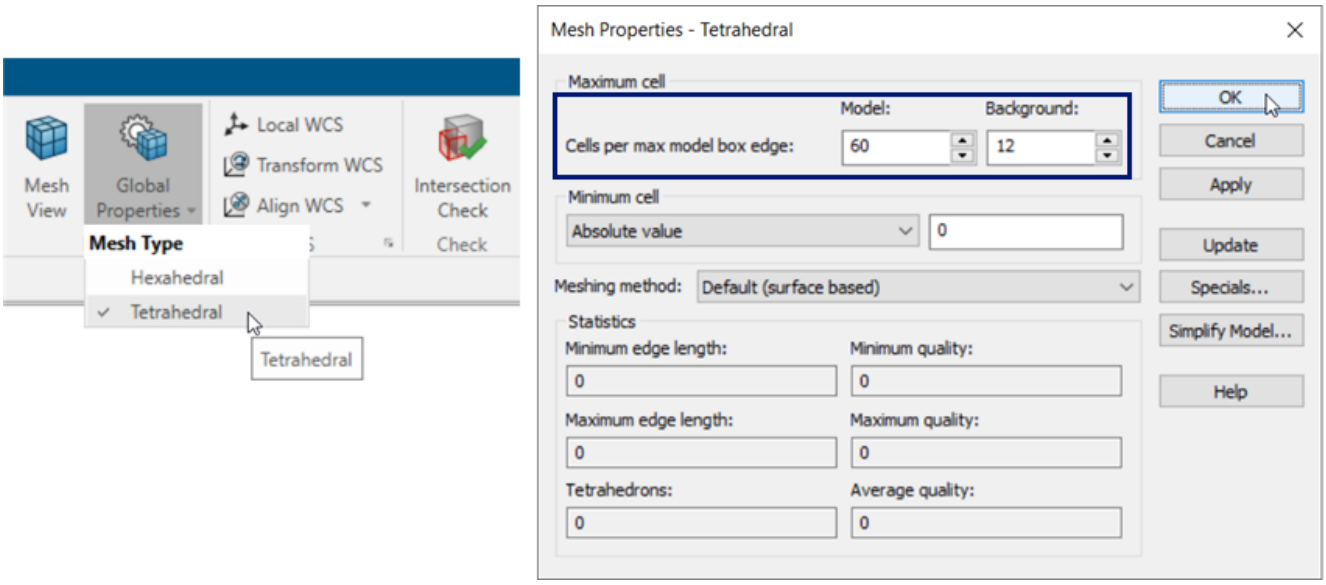


**Figure 11**: Mesh properties dialog.

Simulate using the electrostatic solver simulation switch off mesh adaption to stay in the Student Edition mesh limitations). To observe the field at point of interest, open the "Template Based Post Processing" dialog and from "2D and 3D Field Results" select "Evaluate Field in arbitrary Coordinates"

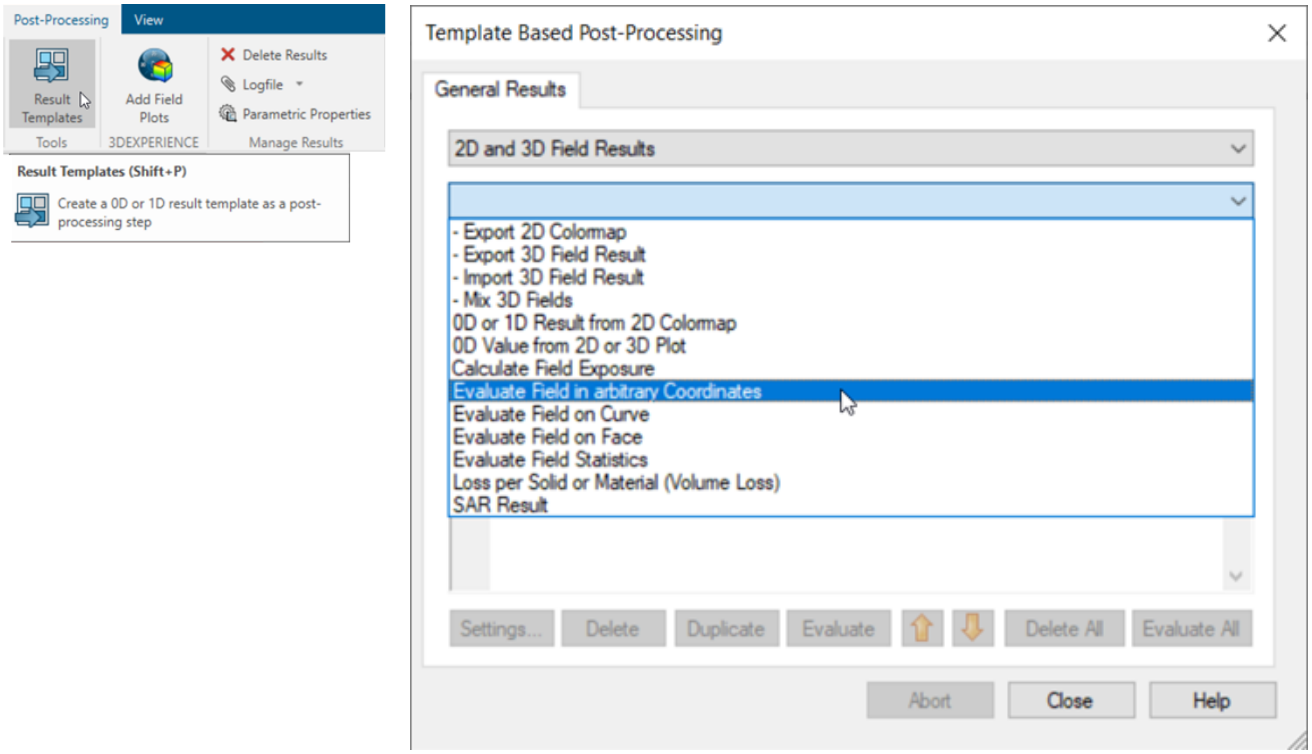


**Figure 12: Post-Processing Template**

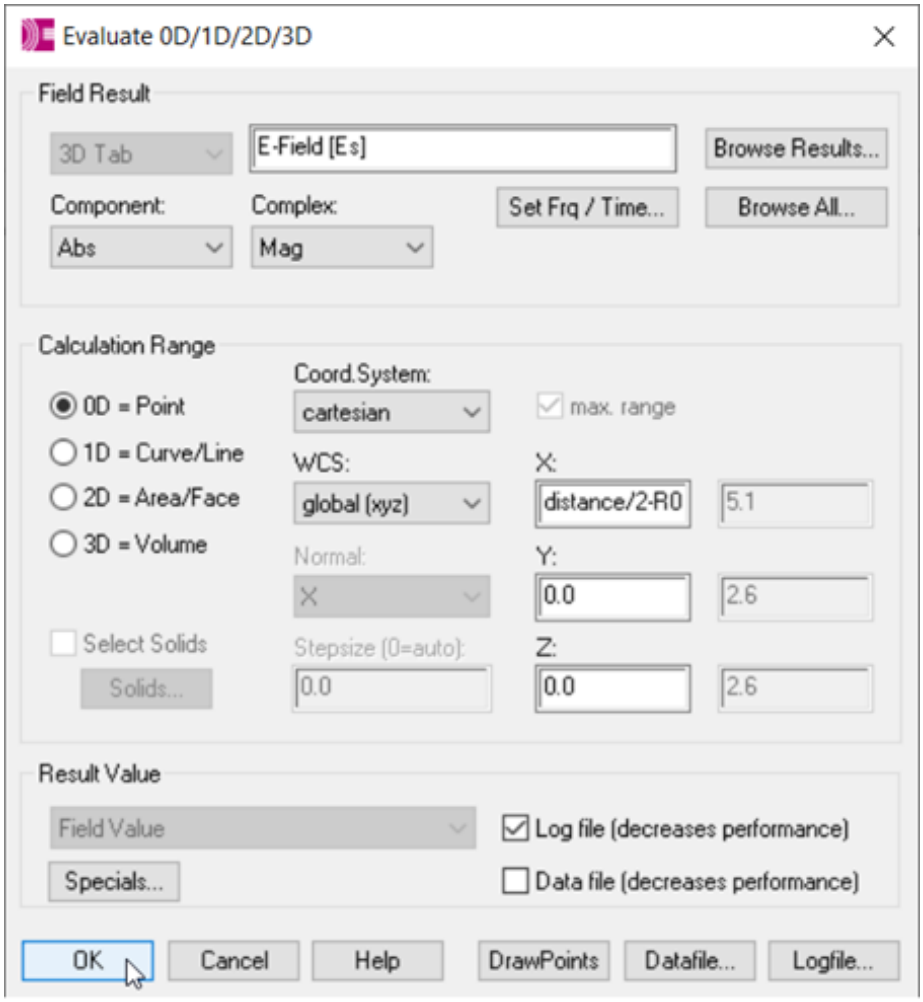


**Figure 13**: Set up of the post processing template.

Once the template has been created, click “Evaluate All” to calculate the field at the point P2.