Question Description

The question is to investigate the property of nano-grating by COMSOL 4.2a. Shown in fig.1 is the structure of a model to calculate the reflection and transmission of a 2D infinite long plane with periodic shallow notches. This structure is regarded a grating. Polarized plane light wave comes from top to down with an incident angle α. The polarization direction of the wave is "go-out" and pendepent to the paper.
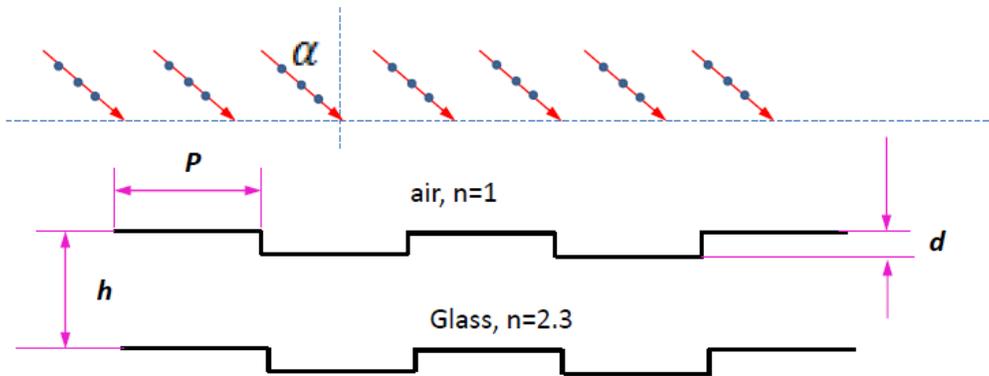

Fig.1 the grating

To simple this model, we only choose one unit and utilize the Floquet boundary. In the COMSOL file, we only plot one unit shown in fig.2. There are two ports: port 1 (light comes in) and port 2 (light comes out). Other related parameters are listed in the following table.

parameters	description	value
α	Incident angle	Sweep from 0-pi/2
lamda	Wavelength of light	623.8nm
p	Half grating constant	370nm
h	thickness	160nm
d	depth	5nm
n1	Refractive index of glass	2.3
n2	Refractive index of air	1

In this model, I follow your example called "Plasmonic wire grating" from your website on RF package. . However, I have one question on plotting the reflection/transmission coefficients obtaining from the S matrix . Even I follow your example of "plasmonic wire grating page 19-20", but COMSOL did not plot the graph. The new code is attached in this email.

Furthermore, I also consider using the "Global variable probe" in your guides to output the graph (this part is not included in this mpgh file). Following COMSOL 4.2->RF module->introduction-> page 18, after running the computation again, COMSOL just shows us the "NaN". It seems the S matrix is not defined successfully in this code.

Also, except for limited explanation on S matrix from the manual, do we have other documents on it? Especially in the future, I may use the S matrix often since it is very important for our nano-photonic calculation.
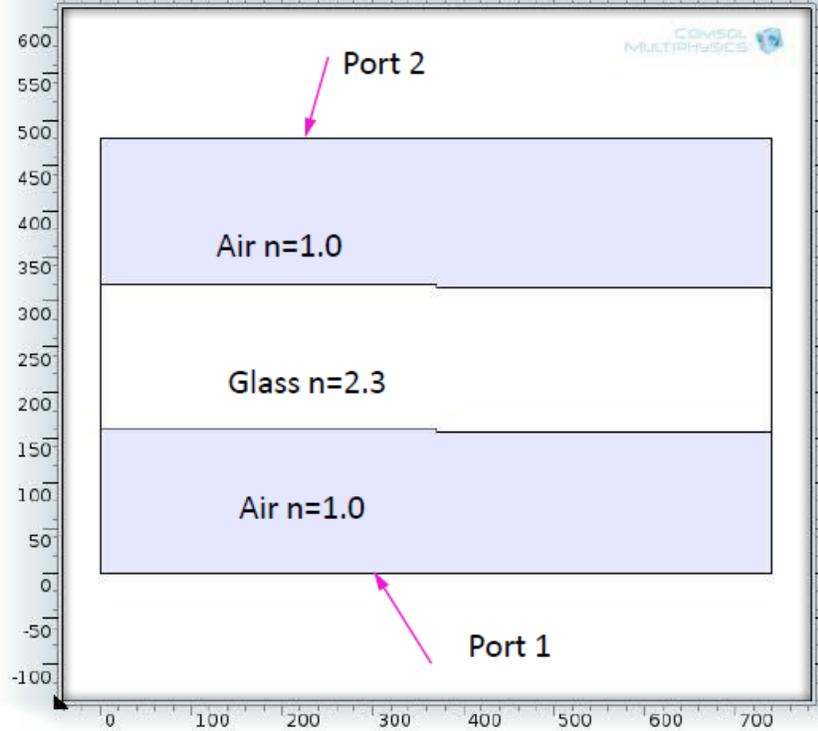

Fig.2 Calculated model