My model is to calculate the R/T coefficients of two parallel gratings with an air gap between them.

However, there appears a distorted wave front for some specific parameters (even I guess this distorted wave front may be correct). I use PML+power flow at two boundaries to calculate the R/T coefficients (see the following figure).



Fig.1 The Calculation of the Transmission and Reflectivity in COMSOL

I obtained a correct result when I used a coarse meshing size. But this result is insufficient accurate for me. I need to calculate R+T close to 1.00004. So I further fine the meshing size. But the result of R/T is not converging. Shown in Fig.2, the sum of R+T is not equal to 1 when the max mesh sizes are 4 and 2 respectively. Meanwhile we can see the distorted wave fronts in Ez at two later graphs. I thought the computing errors come from the distorted wave front.

One coarse meshing (size~10) created by COMSOL automatically is plotted in Fig.3. The full code is attached in the COMSOL file.

In addition, I try a finer meshing size for this model. When I tune the meshing size into 1.0 nm, the computing is out of memory (HP workstation with the memory 16G).



Fig.2 the calculated Ez in different mesh sizes



Fig.3 Meshing (max mesh size ~10)

I attempt some skills meshing, such as “refine” the domains of the gratings and the air gap inside. I also tried different solvers. But they did not work for this problem.

It there any suggestion for this problem?