



EE4580 Quasi Optical Systems (2019-20)

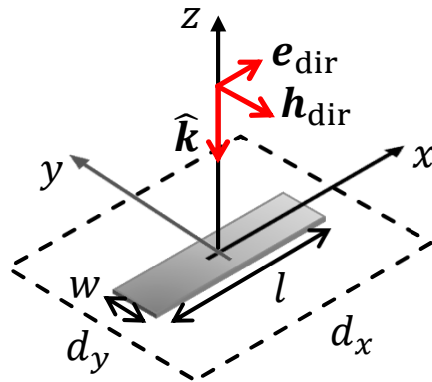
Matlab exercise: Scattering and Patterns from an FSS

Daniele Cavallo

Problem 1

1. Calculate the frequency variation (6 to 14 GHz) of the reflection coefficient for the FSSs in the figures below, under plane-wave illumination.

Dipole strips in free space



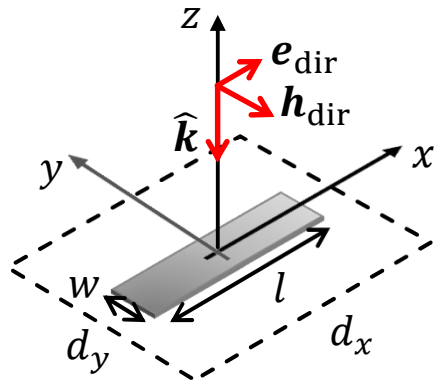
As an example, consider the following geometric parameters

```
dx = 15*mm;    theta = 0;  
dy = 15*mm;    phi   = 0;  
w  = 1 *mm;    TM incidence  
l  = 14*mm;
```

2. Calculate the variation of the reflection coefficient for the FSSs as a function of the angle of incidence at 10 GHz, in the planes $\phi = 0^\circ$ and $\phi = 90^\circ$. What is the maximum angle of incidence in the two planes for which the FSS still reflects more than 90%

Problem 1: Solution

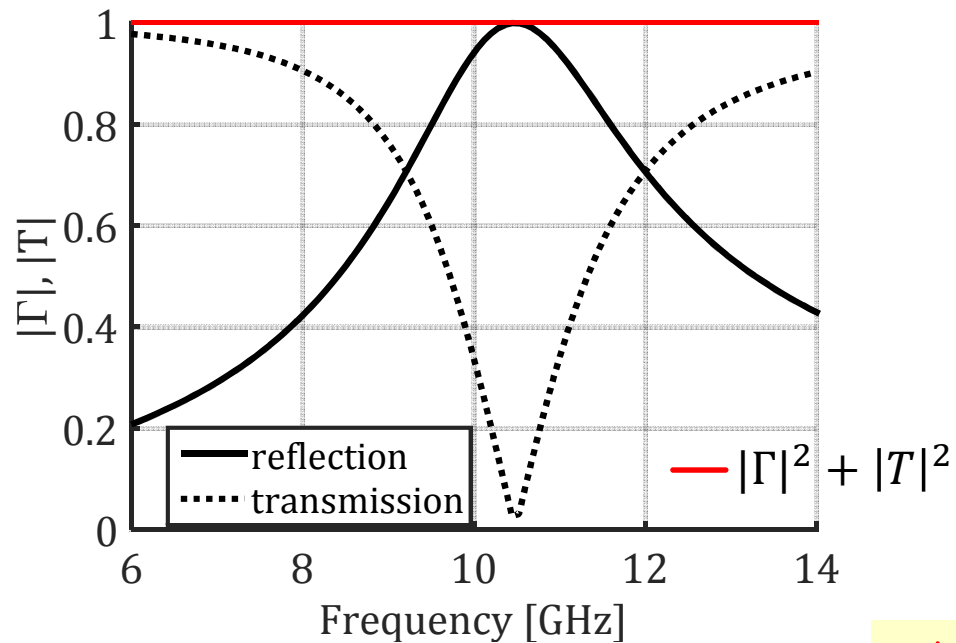
Dipole strips in free space



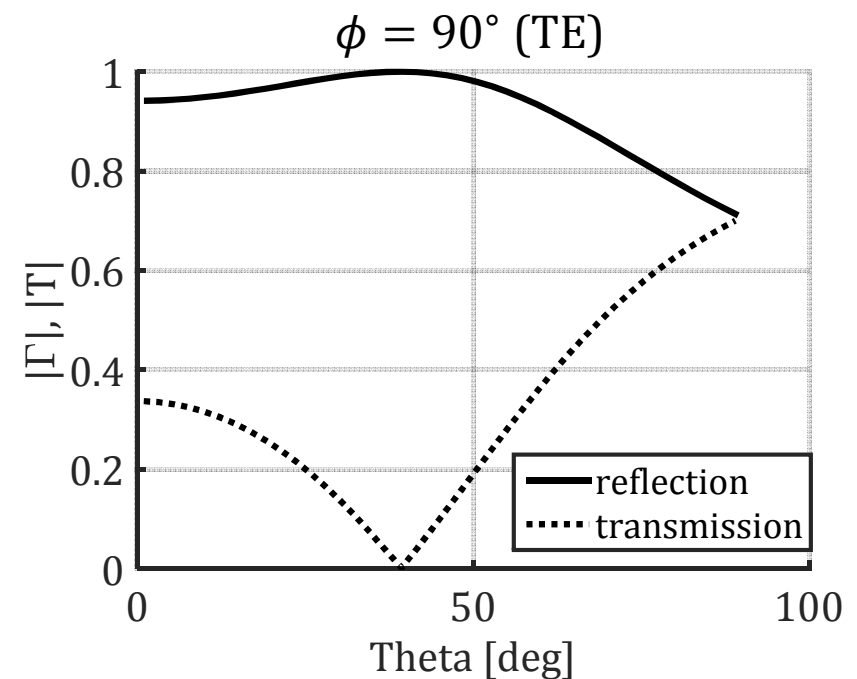
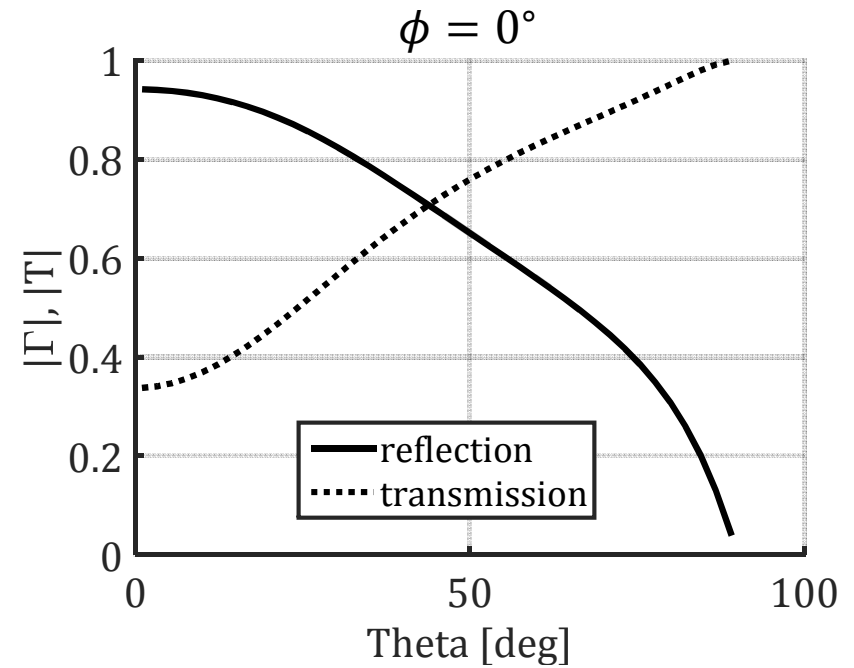
```
dx = 15*mm;
dy = 15*mm;
w = 1 *mm;
l = 14*mm;

theta = 0;
phi = 0;
TM incidence
```

1.

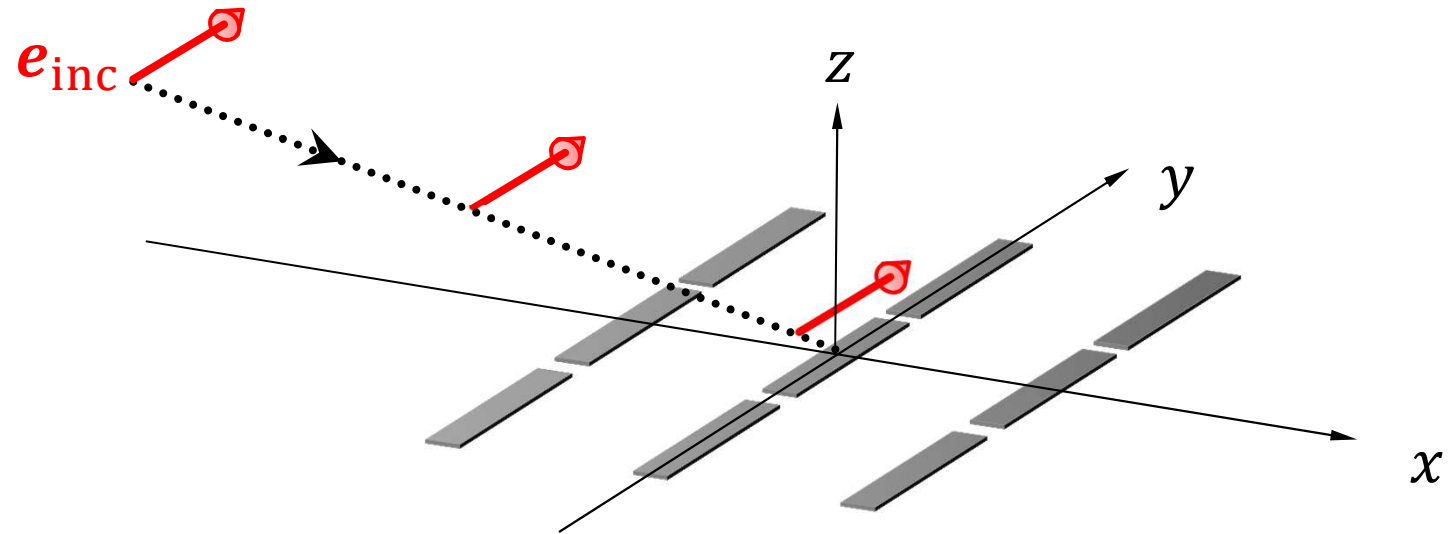


2.



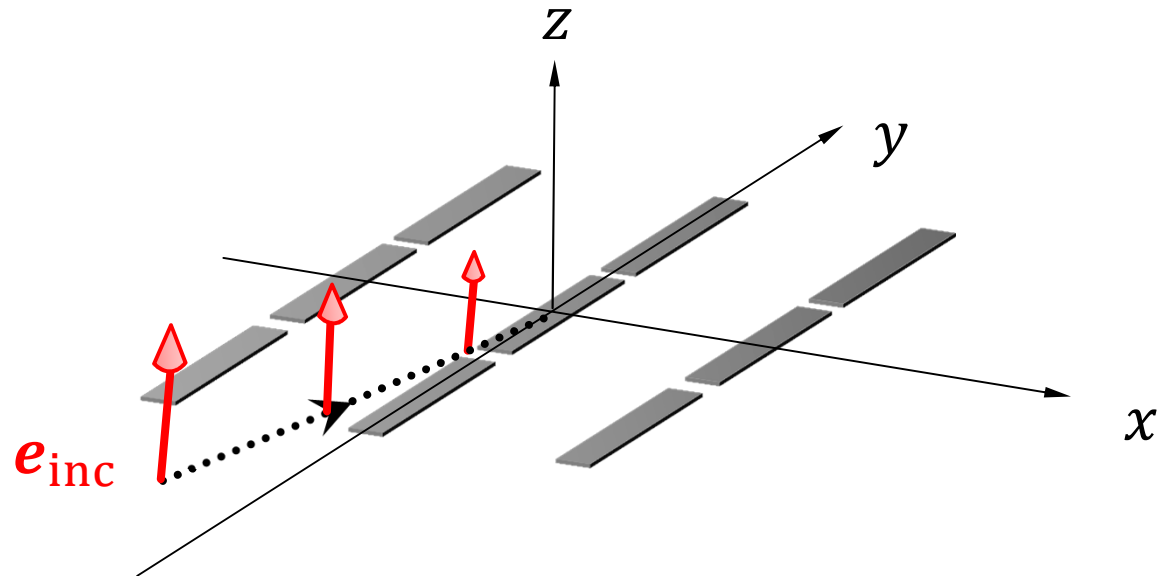
Why TE reflects more than TM at wide incidence angles?

TE



E-field is parallel to the dipoles: it interacts with the dipoles even for 90 degrees incidence

TM



E-field is orthogonal to the dipoles: it does not see the dipoles for 90 degrees incidence