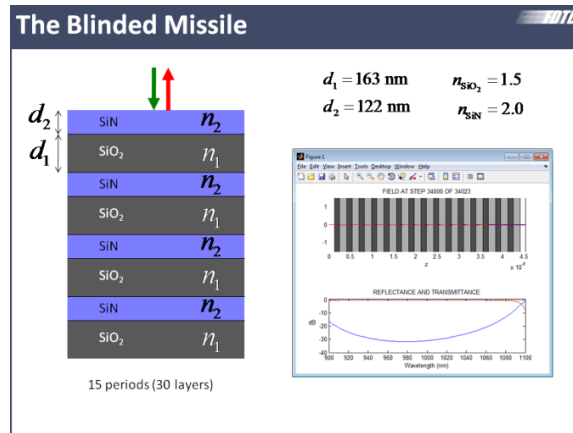
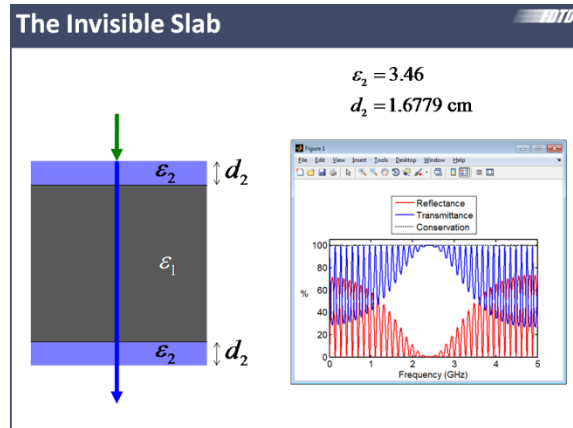
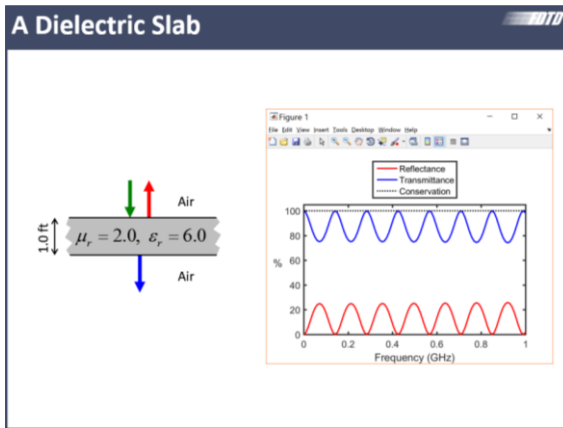


**Problem #1: Benchmark Your 1D FDTD**

Duplicate the results from all **three** simulations discussed in Lecture 9. For each case device provide professional plots of the following: (1) the final reflectance, transmittance, and energy conservation for each device, (2) the amplitude of the steady-state electric field at the design frequency throughout the entire grid superimposed onto the device materials using `draw1d()`. For the dielectric slab use 500 MHz as the design frequency. You will generate a total of six different plots for this problem.



**Hints:**

1. In MATLAB, the `log()` function is a natural logarithm. The function for the base-10 logarithm is `log10()`.
2. When given an amplitude quantity  $A$ , use the following equation for decibel calculation:  $P \text{ (dB)} = 20 \log_{10}(A)$ .
3. When given a power quantity  $U$ , use the following equation for decibel calculation:  $P \text{ (dB)} = 10 \log_{10}(U)$ .