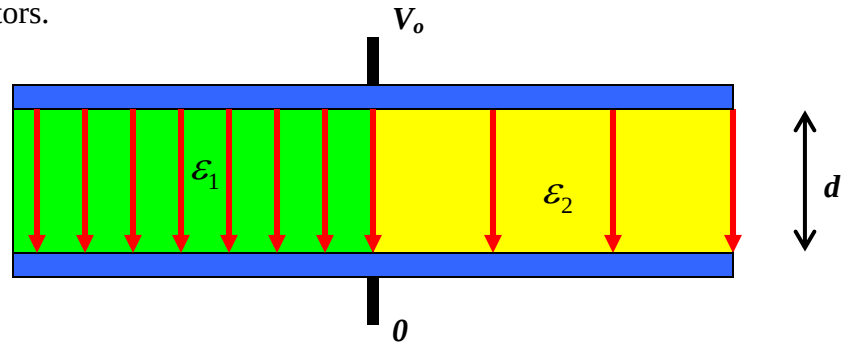
Some Comments on HW 4 and Lecture Quiz 13

1. For HW 4, problem 2, remember to look to the textbook for some help. There is a discussion of parallel plate capacitors with two different dielectrics on or near p 200, depending on what edition you have. Also, keep the following in mind when you do a problem with two different dielectrics side-by-side in the region between two conductors.



Shown here are two parallel plate conductors separated by two different dielectric media, each with their unique value of ε. The red arrows show the electric flux density $\vec{D}$, which is different in the two regions, even though the electric field intensity $\vec{E} = -\hat{x}\frac{V_o}{d}$ in both regions. I have assumed that the x axis points vertically upward. Since the $\vec{D}$ vector is different in the two regions, the surface charge density will also be different in the two regions. (Think of there being a charge at each end of the $\vec{D}$ vector so there will be more charges on the green side than the yellow side.) This is reasonable since a different surface charge density implies a different total charge in each region, even if the areas are the same. The different total charge comes from the fact that the higher dielectric constant region contributes more to the total capacitance than does the lower dielectric constant region.

2. For Lecture Quiz 13, it seems that the wording of the first problem was not clear. Thus, if you manage to get at least 2.5 points on this quiz, your score will be raised to 5 points. *Hints: (1)* Remember that the boundary condition forces the voltage difference on either side of the boundary to change differently, while along the boundary, the voltage only needs to change smoothly as it does everywhere else. (2) For question two, remember that a charge distribution like a point charge will have a voltage even when there are no electrodes nearby. Thus it is not necessary to have conductors, much less conductors held at some voltage, to produce a potential and an electric field.