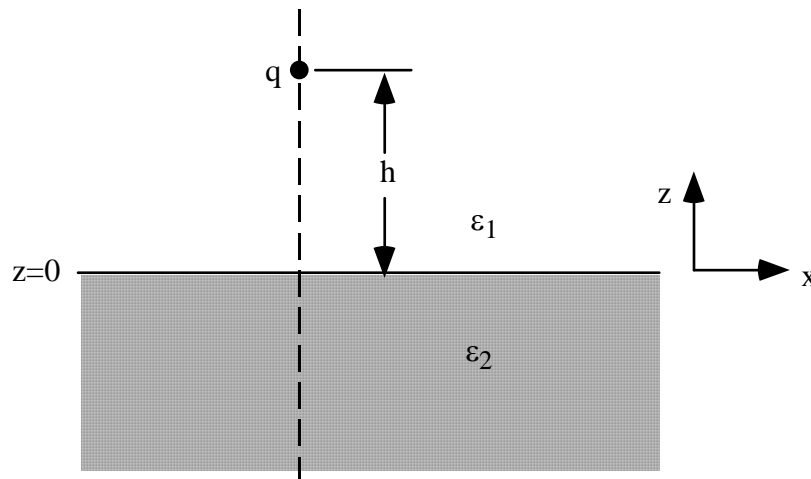


ECE 546 HOMEWORK No 1 - Due Thursday, February 8, 2018



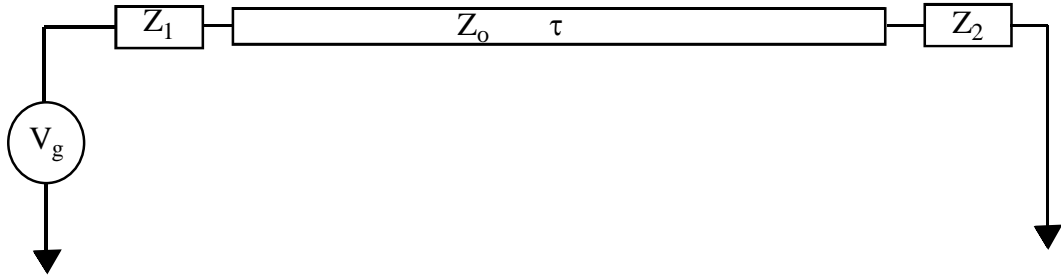
Problem 1

1. Consider a point charge q located in medium 1 at a height h away from a flat boundary of medium 2 as illustrated above. Medium 1 and 2 are characterized by permittivities ϵ_1 and ϵ_2 respectively.

- (a) Find the electrostatic potential measured by an observer $P_1(x, y, z)$ located in medium 1.
- (b) Find the electrostatic potential measured by an observer $P_2(x, y, z)$ located in medium 2.

Problem 2

2. Write a MATLAB program that simulates the response (voltage at near and far ends) of a lossless transmission line terminated with linear resistive loads. Test your program using the example shown below. Use $Z_0 = 75 \Omega$, $\tau = 2.37 \text{ ns}$, $Z_1 = 50 \Omega$, $Z_2 = 1 \text{ K}\Omega$. Optimize your code to minimize run time. Show plots of the pulse response at the near and far ends of the line. Give a listing of your program.



The pulse characteristics for $V_g(t)$ are as shown in the figure below, with

time delay: $t_d = 1$ ns

rise time: $t_r = 1$ ns

fall time: $t_f = 1$ ns

pulse width: $t_w = 20$ ns

pulse amplitude: $V_{\max} = 4$ volts

