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Number : **204**

First: the calculation of the capacitance using both equations:

$$C = \frac{Q}{V} = \frac{1.54 * 10^{-12}}{1} = 1.54 * 10^{-12} \ F$$

$$C = \frac{2 W}{V^2} = \frac{2 * 7.72 * 10^{-13}}{1} = 1.54 * 10^{-12} F$$

Calculate Capacitance analytically:

$$C = \frac{2 \pi \varepsilon_0 l}{\frac{1}{\varepsilon_{r2}} \ln\left(\frac{r_2}{r_1}\right) + \frac{1}{\varepsilon_{r1}} \ln\left(\frac{r_3}{r_2}\right)}$$

$$C = \frac{2 \pi \varepsilon_0 * 0.1}{\frac{1}{3.5} \ln\left(\frac{2}{1}\right) + \frac{1}{2.5} \ln\left(\frac{3}{2}\right)} = 1.544368 * 10^{-12} F$$
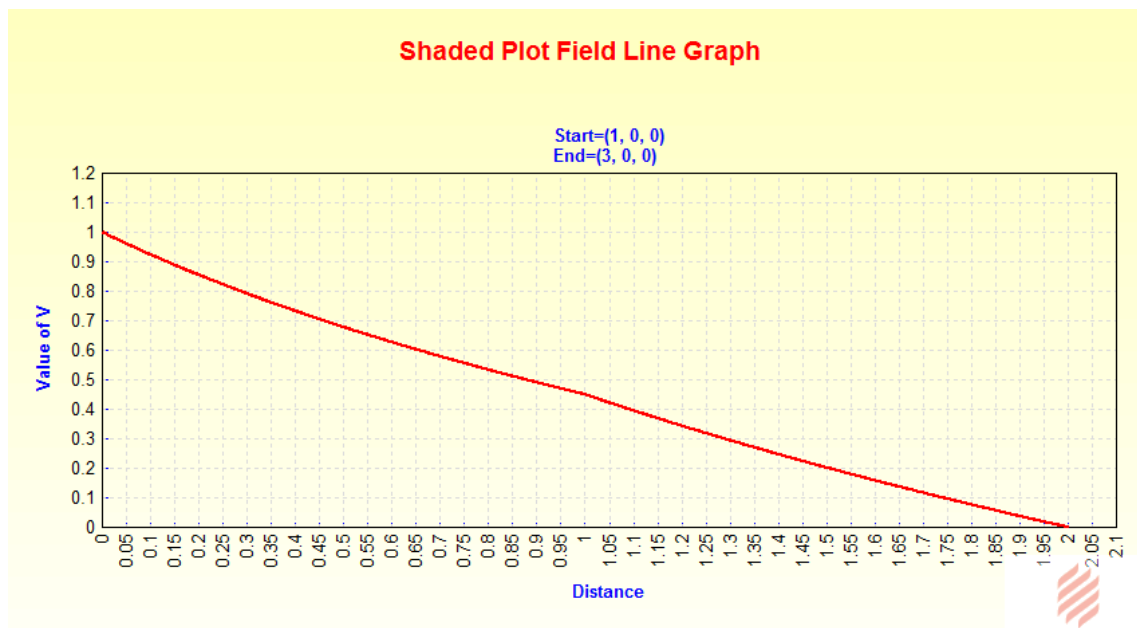
Both equations give the same capacitance for voltage difference between electrodes which equal to 1v and the charge Q = $1.54 * 10^{-12}$.

Second: Plot V, E smoothed and D smoothed from (1,0) to (3,0):
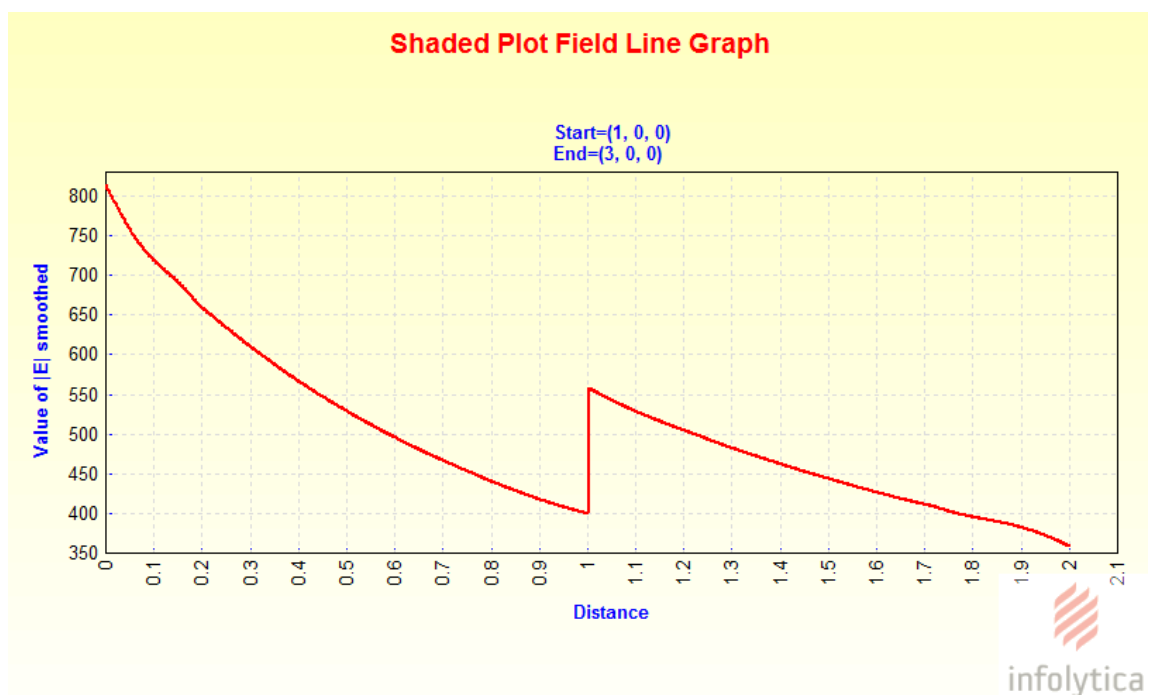
From point (1,0) to the point (3,0): the volt at point (1,0) is 1 volt and decrease gradually till the point (3,0) where there is no electrode in it v = 0.

In E graph we see at the point (1,0) , E has its maximum value as the Volt is the maximum too, and also it's decreasing gradually till the point (3,0)

1) V:

2) $|E|$ Smoothed:

3) $|D|$ Smoothed: