
Your name: _____ ID: _____ Oct. 26th, 2020

EE214000 Electromagnetics, Fall, 2020

Quiz #8-1, Open books, notes (24 points), due 11 pm, Wednesday, Oct. 28st, 2020
(請將 quiz 交至 iLMS 之作業區)

Late submission won't be accepted!

1. Write the expression of the stored energy in a 4-charge system, given V_i , $i = 1, 2, 3, 4$ the electric potentials without Q_i . (3 points)
2. Given the electric field intensity E and electric flux density D in a volume, what is the electric energy density and what is its unit? (4 points)
3. Use the energy-storage approach to calculate the capacitance of the spherical capacitor in Sec. 7.3. In other words, first calculate the electrostatic energy stored between the two spherical electrodes and then determine the capacitance of it. (5 points)
4. Use the constant-voltage and then the constant-charge techniques to calculate the force between two parallel plates of a capacitor holding a charge of $\pm Q$? Compare the two results. The plate has an area S and the two plates are separated by a distance d . The permittivity of the dielectric between the two plates is ϵ . (3+3 points)
5. In Sec. 8.3, when calculating the electrostatic energy for all the fields in all space, (1) why do we drop first term in the following expression

$$W_e = \frac{1}{2} \oint_S V \vec{D} \cdot d\vec{s} + \frac{1}{2} \int_V \vec{D} \cdot \vec{E} dv? \quad (3 \text{ points})$$

(2) Why do you have to keep the second term when performing the integration over an infinite volume, ie., all space? (3 points)