2023-2학기 전자기파와 광학 HW6, Due: 11:59pm November 10 (eTL upload)

Fine name: NAME_ID_HW#, e.g. 홍길동_20230101_HW#

1. **Griffiths example 10.3**

   중간 계산과정 포함하여 상세히 문제를 푸시오.

   Example 10.3. Find the potentials of a point charge moving with constant velocity.

2. **Griffiths problem 10.15**

   Problem 10.15 A particle of charge q moves in a circle of radius a at constant angular velocity ω. (Assume that the circle lies in the xy plane, centered at the origin, and at time $t = 0$ the charge is at $(a, 0)$, on the positive x axis.) Find the Liénard-Wiechert potentials for points on the z axis.

3. **Griffiths equation 10.70 을 유도해 보시오. (Griffiths prob. 10.19 참고)**

$$\frac{\partial \mathbf{A}}{\partial t} = \frac{1}{4\pi\epsilon_0}\frac{qc}{(\imath c - \boldsymbol{\imath}\cdot\mathbf{v})^3}\left[(\imath c - \boldsymbol{\imath}\cdot\mathbf{v})(-\mathbf{v} + \imath\mathbf{a}/c) + \frac{\imath}{c}(c^2 - v^2 + \boldsymbol{\imath}\cdot\mathbf{a})\mathbf{v}\right]. \qquad (10.70)$$

4. **Griffiths equation 10.72 유도과정을 보이시오** . (수업시간에 성실하게 필기한 분에게 유리한 문제입니다)

$$\boxed{\mathbf{E}(\mathbf{r}, t) = \frac{q}{4\pi\epsilon_0}\frac{\imath}{(\boldsymbol{\imath}\cdot\mathbf{u})^3}\left[(c^2 - v^2)\mathbf{u} + \boldsymbol{\imath}\times(\mathbf{u}\times\mathbf{a})\right].} \qquad (10.72)$$

5. **Griffiths example 10.4**

   중간 계산과정 포함하여 상세히 문제를 푸시오.

   Example 10.4. Calculate the electric and magnetic fields of a point charge moving with constant velocity.

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6. **Griffiths problem 10.22**

Problem 10.22

(a) Use Eq. 10.75 to calculate the electric field a distance d from an infinite straight wire carrying a uniform line charge λ, moving at a constant speed v down the wire.

(b) Use Eq. 10.76 to find the *magnetic* field of this wire.