HW 6

Probelm 1

对于 $ordinary\ wave, heta_1= heta_2$ 对于 $extraordinary\ wave, heta_2> heta_1$

Problem 2

(a)

由于
$$\sigma_z = 0.2\epsilon_0 > 0$$
且足够厚把 z 变换到 u 或 v 都能满足条件

(b)

等价于求
$$d_p$$
 $K_I=w\sqrt{u\epsilon}[rac{1}{2}(\sqrt{1+rac{\sigma^2}{\epsilon^2w^2}}-1)]^{0.5}$ $d_p=rac{1}{K_I}=3.18\lambda$

(c)

$$z->w,x->u,y->v$$
 $E_{inc}=rac{E_o}{\sqrt{2}}(x-y)cos(k_0z-wt)$ $z=d$ 时,由于是 $circularly\ polarized$ $(2\sqrt{3}-1)k_0d=rac{\pi}{2}$ $d=rac{\lambda}{4(2\sqrt{3}-1)};$ 此时是右旋的

Problem 3

(a)

$$\overline{\overline{z}} = \begin{bmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

$$0 & 0 & 0$$

(b)

$$egin{aligned} rac{dM}{dt} &= gu_0 M imes H = gu_0 [(ec{z}M_0 + M_1) imes (ec{z}H_0 + H_1)] \ & ext{由于} M_1 imes H_1 op Z imes M_1 \ & ext{上式等于} gu_0 (M_0 ec{z} imes H_1 - H_0 ec{z} imes M_1) \ & ext{=} gu_0 (M_0 ec{\overline{z}} \cdot H_1 - H_0 ec{\overline{z}} \cdot M_1) \ & ext{B} = u_0 (H + M) \ & ext{B} = u_0 (H + M_1) = \overline{\overline{u}} \cdot H_1 \ & ext{u} & ext{i} u_g & 0 \ & ext{T以得到} \overline{\overline{u}} = [-iu_g & u & 0] \ & ext{0} & 0 & u_z \end{aligned}$$

(c)

$$egin{align*} v & iv_g & 0 \ \overline{\overline{v}} = [-iv_g & u & 0 \,] \ 0 & 0 & v_z \ \ = > [rac{u^2 - kv}{ikv_g cos heta} & u^2 - k(vcos^2 heta + v_z sin^2 heta)] \cdot [rac{B_1}{B_2}] = 0 \ \ rac{D_2}{D_1} = -rac{B_1}{B_2} = rac{(v - nu_0)sin^2 heta_0 \pm \sqrt{(v - v_0)^2 sin^4 heta + 4v_g^2 cos^2 heta^2}}{2iv_g cos heta} \ \end{array}$$

(d)

定义
$$cos2\phi=rac{2v_gcos heta}{(v-v_z)sin^2 heta}$$
 $rac{D_2}{D_1}=itan\phi$ 或 $icot\phi$,是椭圆极化波 $=>Faraday\ rotation\ exists$