

6.630 Solution to Problem Set 8

Solution P8.1

$$\theta_c = \arcsin^{-1}(n_2/n_1) = 89.7^\circ$$

Solution P8.2

- (a) The Brewster angle for $\epsilon_t = 9$ is $\theta_B = \tan^{-1} \sqrt{\epsilon_t} = \tan^{-1} \sqrt{9} = 71.57^\circ$.
- (b) The dominant portion of the sun glares is TE polarized wave. The polaroid glasses absorb the TE component of the incident light, thus the TM component reaches the eyes after passing through the polaroid glasses.

Solution P8.3

The critical angle $\theta_c = \sin^{-1} \sqrt{\epsilon}$

$$\overline{E}_i = \hat{y} \frac{2E_0}{3\sqrt{2}} e^{ik_x x + ik_z z} + E_0 \left[\frac{\hat{z}}{2\sqrt{2}} - \frac{\hat{x}}{2\sqrt{6}} \right] e^{ik_x x + ik_z z - i\pi/2}$$

$$\overline{E}_r = \hat{y} \frac{E_0}{3\sqrt{2}} e^{-ik_x x + ik_z z}$$

(c.i) $\phi = 0$

(c.ii) constant, maximum value $2E_0$