

Problem 8.31 A parallel-polarized plane wave is incident from air onto a dielectric medium with $\epsilon_r = 9$ at the Brewster angle. What is the refracted angle?

Solution:

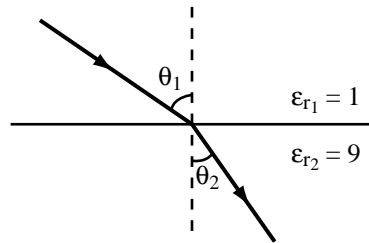


Figure P8.31: Geometry of Problem 8.31.

For nonmagnetic materials, Eq. (8.72) gives

$$\theta_1 = \theta_B = \tan^{-1} \sqrt{\frac{\epsilon_2}{\epsilon_1}} = \tan^{-1} 3 = 71.57^\circ.$$

But

$$\sin \theta_2 = \frac{\sin \theta_1}{\sqrt{\epsilon_{r2}}} = \frac{\sin \theta_1}{3} = \frac{\sin 71.57^\circ}{3} = 0.32,$$

or $\theta_2 = 18.44^\circ$.
