1   2

θ_1

Our general solution for the transmitted wave is

$$\tilde{\vec{E}}_T(\vec{r},t) = \tilde{\vec{E}}_{0T} e^{i(\vec{k}_2 \cdot \vec{r} - \omega t)}$$

Snell's law tells us $\quad n_1 \sin\theta_1 = n_2 \sin\theta_2$

If $n_2 < n_1$, there is a critical angle, $\quad \sin\theta_{1,C} = n_2 / n_1$

beyond which there is no real solution for θ_2.

How should we interpret this lack of solution *physically?*

A: Total internal reflection – all the light gets reflected, none transmitted.