

c) For the Selfoc fiber we have 4/6

$$H = - [n^2(\vec{r}) - p_x^2 - p_y^2]^{1/2} \quad \text{and} \quad \text{4/7 cont}$$

$$n = n_0 \left[ 1 - \alpha^2 (x^2 + y^2) \right] \Rightarrow$$

$$H = - \left[ n_0^2 - n_0^2 \alpha^2 (x^2 + y^2) - p_x^2 - p_y^2 \right]^{1/2}$$

Write this as

$$H = - [n_0^2 - 2K]^{1/2} \quad \text{where}$$

$$K = [p_x^2 + p_y^2 + n_0^2 \alpha^2 (x^2 + y^2)] / 2.$$

Then Hamilton's eqns of motion give

$$x' = \frac{\partial H}{\partial p_x} = - \left( \frac{1}{2} \right) [n_0^2 - 2K]^{-1/2} (-2) \frac{\partial K}{\partial p_x} \Rightarrow$$

$$\boxed{x' = [n_0^2 - 2K]^{-1/2} \frac{\partial K}{\partial p_x}} \quad \text{Similarly,}$$

$$p_x' = - \frac{\partial H}{\partial x} = - [n_0^2 - 2K]^{-1/2} \frac{\partial K}{\partial x}, \text{ etc.}$$