

$$n'/x' = n/x + \phi'$$

$$\sin \varepsilon = (r - x)/r \sin \sigma$$

$$\sin \varepsilon' = n/n' \sin \varepsilon$$

$$\sigma' = \sigma - \varepsilon + \varepsilon'$$

$$x' = r - r \sin \varepsilon' / \sin \sigma'$$

$$h = r \sin(\sigma - \varepsilon)$$

$$x \rightarrow \infty : \sin \varepsilon = -h/r$$

$$r \rightarrow \infty : \quad \varepsilon = \sigma$$

$$\sin \varepsilon' = n/n' \sin \varepsilon$$

$$\sigma' = \varepsilon'$$

$$x' = x \operatorname{tg} \sigma / \operatorname{tg} \sigma'$$