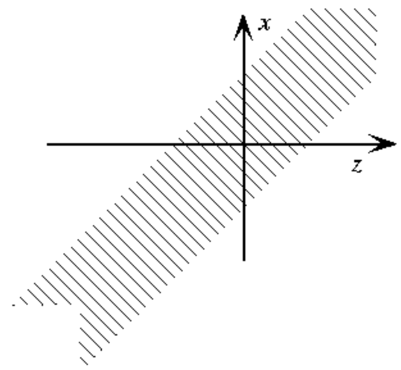
ANGLE & INTENSITY VS. PHASE & AMPLITUDE: a cross-reference

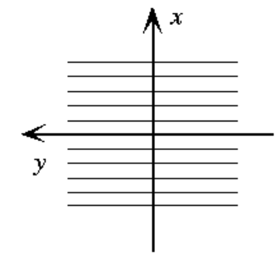
angle description	wavefront snapshot	phase description	"phase footprint" contours of equal phase (0° or n·360°)

inclined plane wave:

$$\theta(x,y) = \theta_0$$



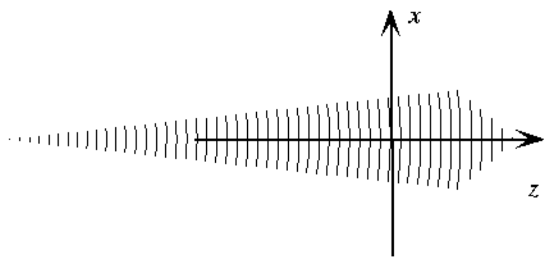
$$\phi(x,y) = \frac{2\pi}{\lambda}\cdot\sin\theta_0\cdot x$$



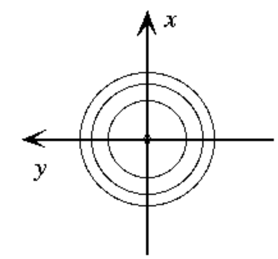
on-axis spherical wave:

We must restrict our attention to the x-z plane because, for non-zero values of y, the normal to the wavefront tilts out of the plane, and the angle cannot be so simply described.

$$\theta(x,0) = \frac{1}{R_0}x$$

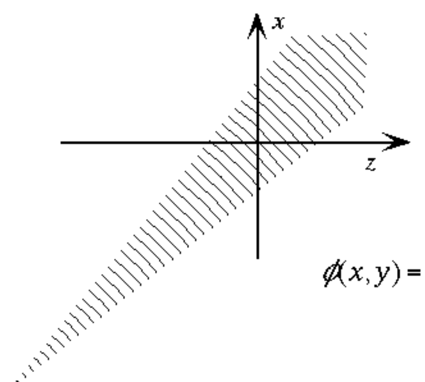


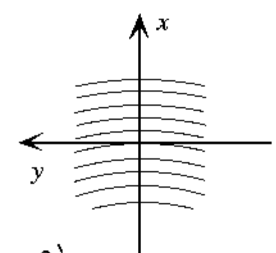
$$\phi(x,y) = \frac{2\pi}{\lambda}R_0 + \frac{\pi}{\lambda R_0}(x^2 + y^2)$$



off-axis spherical wave:

$$\theta(x,0) = \theta_0 + \frac{\cos\theta_0}{R_0}x$$





$$\phi(x,y) = \frac{2\pi}{\lambda}R_0 + \frac{2\pi}{\lambda}\sin\theta_0\cdot x + \frac{\pi}{\lambda R_0}\left(\cos^2\theta_0\cdot x^2 + y^2\right)$$

in general: $\sin\theta(x,0) = \frac{\lambda}{2\pi}\frac{d\,\phi(x,y)}{d\,x}\Big|_{x,0}$

$= \cos\theta_x$, or ℓ in disguise