# Ellipsoidal Mirrors

In Solution , when $k$>0 and $c$>0, we get the ellipsoidal mirror:

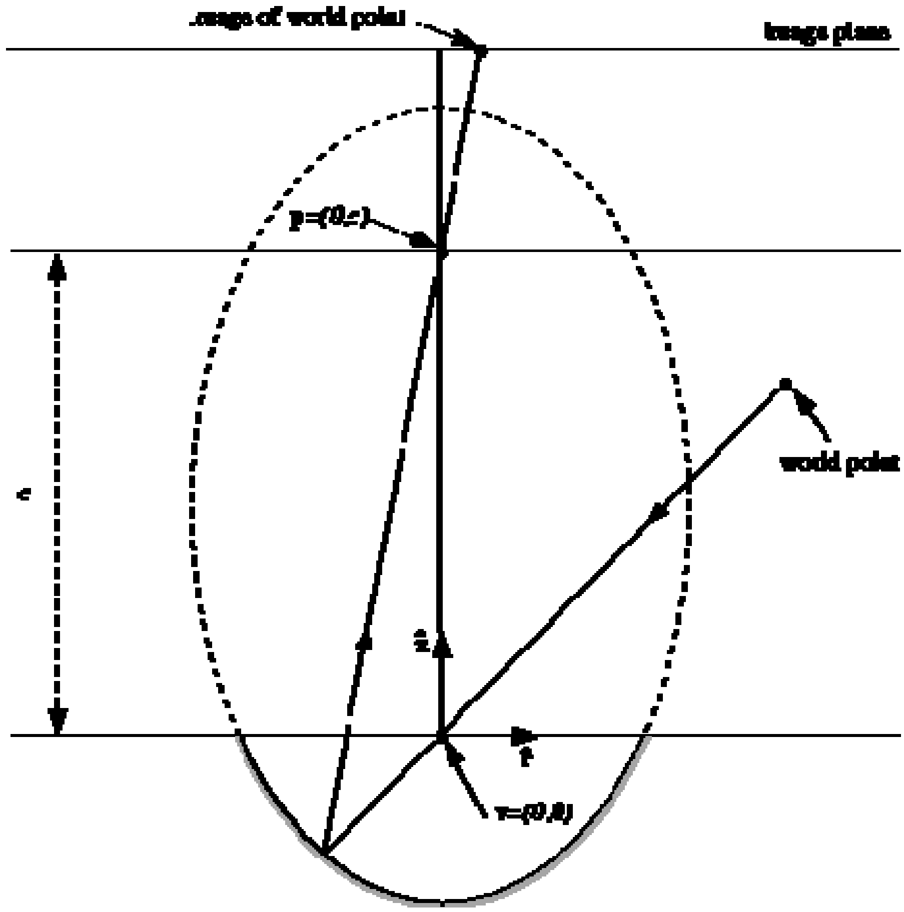
$$\frac{1}{a_e^2}\left(z-\frac{c}{2}\right)^2+\frac{1}{b_e^2}r^2 = 1$$

where:

$$a_e=\sqrt{\frac{2k+c^2}{4}} \quad \text{and} \quad b_e=\sqrt{\frac{k}{2}}.$$

The ellipsoid is the first solution that can actually be used to enhance the field of view. As shown in Figure, if the viewpoint and pinhole are at the foci of the ellipsoid and the mirror is taken to be the section of the ellipsoid that lies below the viewpoint (i.e. $z < 0$), the effective field of view is the entire upper hemisphere $z \geq 0$ .

**Figure 6:** The ellipsoidal mirror satisfies the fixed viewpoint constraint when the pinhole and viewpoint are located at the two foci of the ellipsoid. If the ellipsoid is terminated by the horizontal plane passing through the viewpoint $z = 0$, the field of view is the entire upper hemisphere $z > 0$. It is also possible to cut the ellipsoid with other planes passing through $\mathbf{v}$, but it appears there is to be little to be gained by doing so.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