

The Ellipsoid *

See in Documentation: About Quadratic Surfaces.

The Ellipsoid in 3D-XplorMath is *parametrized* as

$$x = aa \cdot \sin u \cdot \cos v, \quad y = bb \cdot \sin u \cdot \sin v, \quad z = cc \cdot \cos u,$$

with the default $aa = bb = 1.5$, $cc = 2.0$. It is given by the

Implicit Equation

$$f(x, y, z) := (x/aa)^2 + (y/bb)^2 + (z/cc)^2 = 1.$$

In 3D-XplorMath the Ellipsoid is shown together with a few rays which leave one focal point, are reflected in the surface and come together again in the other focal point. This illustrates the use of the Ellipsoid as a *Whispering Gallery*. A whispering gallery may be realized by an Ellipsoid ceiling in a pub so that the conversations at one table can be heard at another table. Whispering galleries were also built in royal parks with some ellipsoid reflector near a table for visitors placed at one focal point and a hidden chair for the listener at the other focal point.

The first **default Morph** varies the size of the Ellipsoid. One can also select in the View Menu **Morph Light Source Of Rays** to illustrate that the rays do not come together at one point unless they start from a focal point.

* This file is from the 3D-XplorMath project. Please see:

<http://3D-XplorMath.org/>

By selecting **Remove Focal Rays** in the Action Menu one returns to the standard rendering of surfaces. One may turn on the focal rays only if **Wireframe Display** is selected.

For geometric arguments concerning the focal points see: **Ellipse** in the **Plane Curve** category.

H.K.