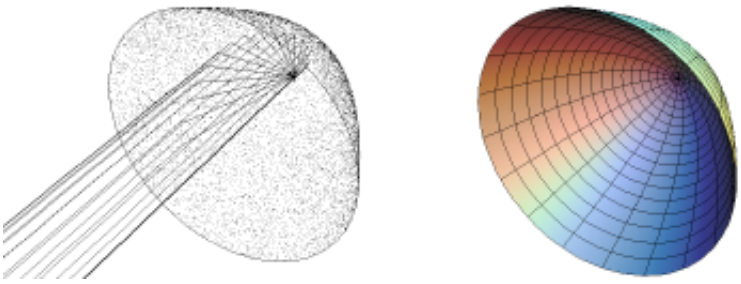
The Paraboloid *

See in Documentation: About Quadratic Surfaces.



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

$$x = aa \cdot u \cdot \cos(v), \quad y = bb \cdot u \cdot \sin(v), \quad z = cc \cdot u^2 - dd,$$

with the default $aa = bb = 1,\ cc = 0.4,\ dd = 2$. It is given *implicitly* by $f(x, y, z) := \frac{(z+dd)}{cc} - (\frac{x}{aa})^2 - (\frac{y}{bb})^2 = 0$.

The paraboloid is shown together with a few rays parallel to the z-axis, the axis of revolution symmetry of this surface. These rays are reflected in the surface and continued until they meet in the focal point of this paraboloid. This image looks somewhat like the reflector of a car headlight together with the rays from the light bulb, reflected into parallel rays. The `default Morph` varies cc so that the image changes from a headlight reflector to a satellite antenna, with incoming parallel rays concentrated on the receiver at the focal point of the antenna.

The entry `Remove Focal Rays` in the Action Menu returns to the standard rendering for surfaces. Only in `Wireframe`

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

http://3D-XplorMath.org/

`Display` can one switch on the focal rays in the Action Menu.

For geometric arguments concerning the focal point see: `Parabola` in the Plane Curve category.

H.K.