Quadric Surfaces

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Cylinders

A set of lines parallel to a given line passing through a given curve is known as a cylindrical surface, or **cylinder**, The parallel lines are called **rulings**. The **traces** of a surface are the cross-sections created when the surface intersects a plane parallel to one of the coordinate planes.

Quadric Surfaces

Quadric surfaces are the graphs of expressions that can be expressed in the form

$$Ax^2 + By^2 + Cz^2 + Dxy + Exz + Fyz + Gx + Hy + Jz + K = 0$$

Common Quadric Surfaces

1. **Ellipsoid**
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$
2. **Hyperboloid of One Sheet**
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$$
3. **Hyperboloid of Two Sheets**
$$\frac{x^2}{a^2} - \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$$
4. **Elliptic Cone**
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 0$$
5. **Elliptic Paraboloid**
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = z$$
6. **Hyperbolic Paraboloid**
$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = z$$