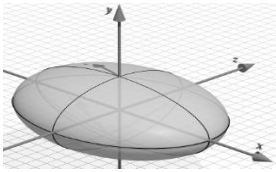


## Surfaces of the Second Order

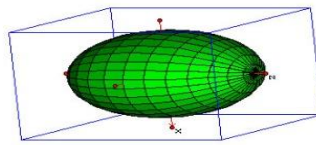
### Non-Singular Irreducible Surfaces:

Ellipsoid:



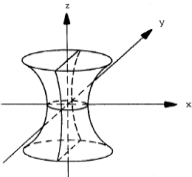
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

Imaginary Ellipsoid:



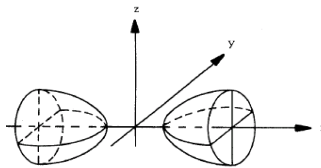
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = -1$$

One-Sheet Hyperboloid:



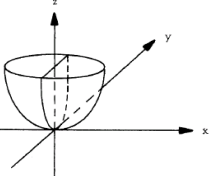
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$$

Two-Sheet Hyperboloid:



$$-\frac{x^2}{a^2} - \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

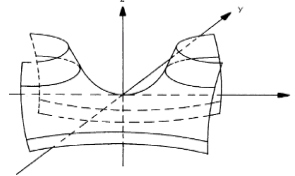
Elliptic Paraboloid:



$$\frac{x^2}{p} + \frac{y^2}{q} = 2z$$

where  $p, q > 0$

Hyperbolic Paraboloid:

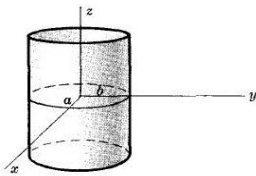


$$\frac{x^2}{p} - \frac{y^2}{q} = 2z$$

where  $p, q > 0$

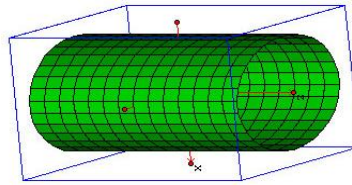
### Singular Irreducible Surfaces:

Elliptic Cylinder:



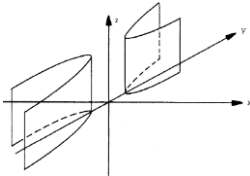
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

Imaginary Elliptic Cylinder:



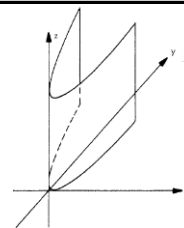
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = -1$$

Hyperbolic Cylinder:



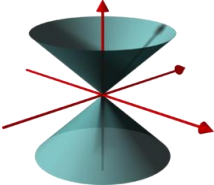
$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

Parabolic Cylinder:



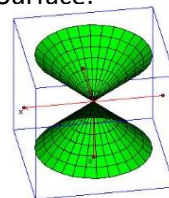
$$y^2 = 2px$$

Conical Surface:



$$\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 0$$

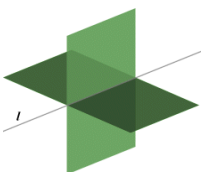
Imaginary Conical Surface:



$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 0$$

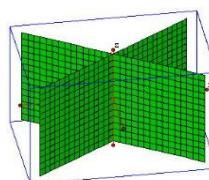
### Singular Reducible Surfaces:

Intersecting Planes, Pair:



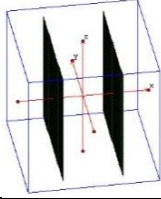
$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$$

Imaginary Intersecting Planes, Pair:



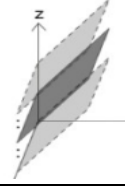
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 0$$

Parallel Planes, Pair:



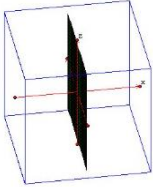
$$\frac{x^2}{a^2} = 1$$

Imaginary Parallel Planes, Pair:



$$x^2 + a^2 = 0$$

Coincident Planes, Pair:



$$x^2 = 0$$