

# User Manual 4.0 Spheroids

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### Definition

A spheroid, or ellipsoid of revolution is a quadric surface obtained by rotating an ellipse about one of its principal axes; in other words, an ellipsoid with two equal equatorial radii. Assuming the XYZ coordinate system is such that the spheroid is centered and axis-aligned, the spheroids equation is given by:

$$\mathcal{S} = \left\{ (x, y, z) \in \mathbb{R}^3 \mid \frac{x^2 + y^2}{a^2} + \frac{z^2}{b^2} = 1 \right\}$$



The equatorial radius is called the transverse radius whereas the polar radius  $b$  is the conjugate radius.

### Implementation

The Spheroid object in the SIRIUS library implements the [Ellipsoid interface](#). Please refer to the [Javadoc](#) for a complete list of public methods.

### Instantiation

In order to instantiate a spheroid object, the user must specify the spheroids' center, it's axis of revolution and both semi-axis (the transverse radius  $a$  and the conjugate radius  $b$ ). For example :

```
// Spheroid parameters
Vector3D position = new Vector3D(1, 2, 3);
Vector3D revAxis = new Vector3D(0, 1, 1);
double a = 2.0;
double b = 1.0;
// The spheroid itself
Spheroid mySpheroid = new Spheroid(position, revAxis, a, b);
```

### Usage

Please refer to the [\[MAT\\_GEO\\_Home#HInteractions Interactions with other geometrical objects](#)

section] for methods inherited from the Shape interface.

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• Dernière modification de cette page le 5 avril 2018 à 07:43.

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