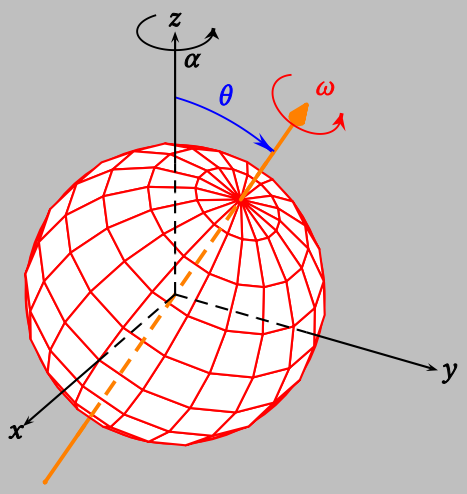
pst-nutation

Rotation, Precession, Nutation with pst-nutation; v.0.01

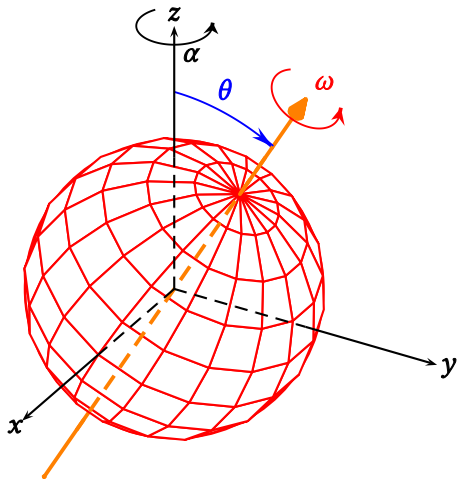
December 20, 2025



Package author(s):
Manuel Luque
Herbert Voß

This exercise illustrates the concepts of rotation, precession, and nutation. [2, 1] `pst-nutation` package is designed for this purpose, using the command `\psNutation[`*options*`]`.

1 The options



All angles are in degrees.

`theta=-30` : tilt of the axis relative to *Oz*;

`omega=0` : angle of rotation around the sphere's axis;

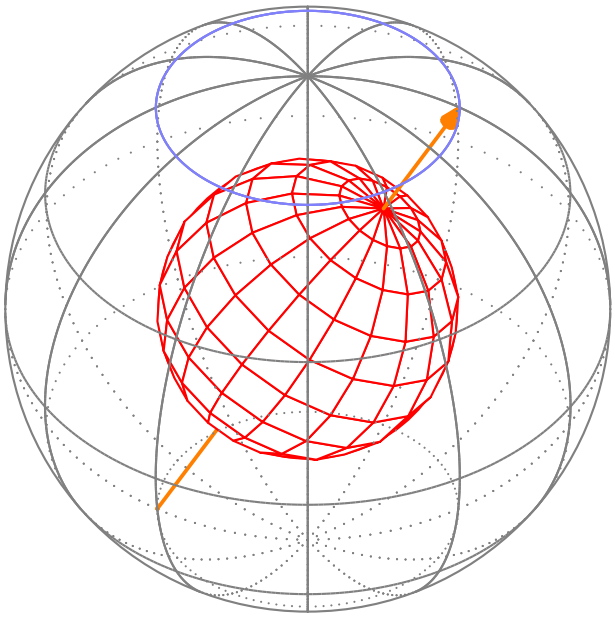
`alpha=0` : angle of rotation of the entire system around *Oz*;

`dtheta=5` : amplitude of the tilt variations in the case of nutation;

`frequency=6` : frequency of the axis's oscillations in the case of nutation.

`LargeSphere=true` : A Boolean to draw the large sphere on which the curves will be inscribed.

2 The rotation

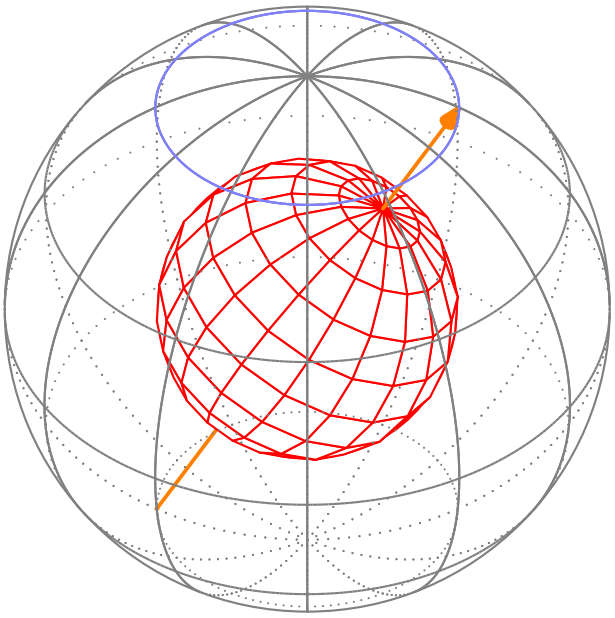


Animation of first image

```
\begin{animateinline}[controls,loop,
                      begin={\begin{pspicture}[showgrid=](-5,-5)(5,5)},
                      end={\end{pspicture}}]{20}% 20 images/s
\multiframe{19}{iA=0+1}{%
  \psset{viewpoint=1000 0 40 rtp2xyz, Decran=1000}
  \psNutation[omega=\iA,dtheta=0,frequency=0,theta=-30]}
\end{animateinline}
```

By default on the sphere, the meridians are spaced 20 degrees apart `ngrid=9 18`. The loop rotates the sphere by 1 degree at each step, thus creating the illusion of a complete rotation with the `loop` option of the animate package.

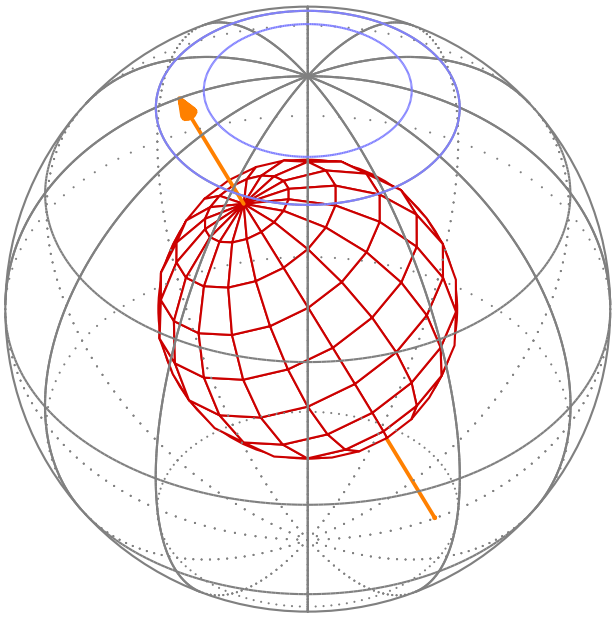
3 Rotation and Precession



Animation of second image

```
\begin{animateinline}[controls,loop,
                      begin={\begin{pspicture}[showgrid=](-5,-5)(5,5)},
                      end={\end{pspicture}}]{20}% 20 images/s
\multiframe{73}{n=0.00+0.25,N=0.0+5.0}{
\psset{viewpoint=500 0 40 rtp2xyz,Decran=500}
\psNutation[omega=\n,alpha=\N,frequency=0,dtheta=0]}
\end{animateinline}
```

4 Rotation with Precession and Nutation



Animation of third image

```
\begin{animateinline}[controls,loop,
                      begin={\begin{pspicture}[showgrid=](-5,-5)(5,5)},
                      end={\end{pspicture}}]{10}% 10 images/s
\multiframe{73}{n=0.00+0.25,N=0.0+5.0}{
\psset{viewpoint=1000 0 40 rtp2xyz,Decran=1000}
\psNutation[omega=\n,alpha=\N,frequency=6,theta=25]}
\end{animateinline}
```

5 Animation

The conversion to `.gif` is done by the program `magick`, formerly known as `convert`:

Converting pdf to gif

```
magick convert -delay 5 -density 100x100 -alpha remove anim1.pdf -loop 0 anim1.gif
```

References

[1] Richard Fitzpatrick. *Introduction to Celestial Mechanics. Forced precession and nutation of Earth.* URL: https://farside.ph.utexas.edu/teaching/celestial/Celestial/node74.html (visited on 12/20/2025).

[2] Wikipedia. *Nutation.* URL: https://en.wikipedia.org/wiki/Nutation (visited on 12/19/2025).

Index