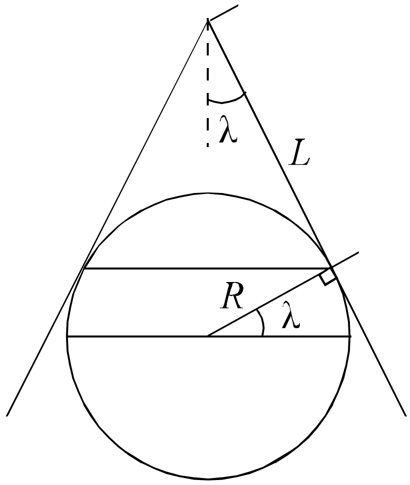
Foucault Pendulum – a Geometric Analysis



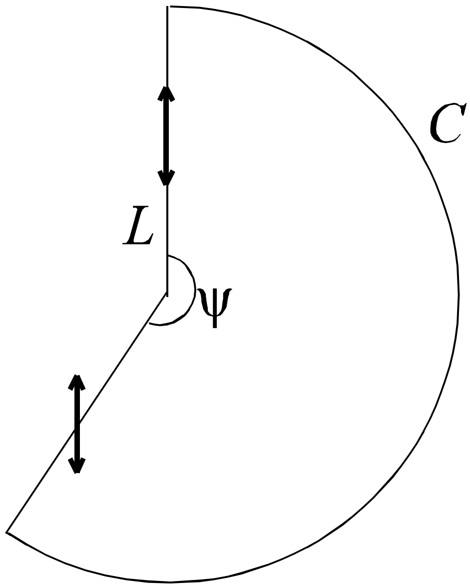
If your latitude is λ, draw a cone 1) with its axis on the earth's axis, 2) tangent to the earth at all points on the line of latitude. The distance from the vertex of the cone to the latitude line is:

$$L = R\cot\lambda$$

The circumference of the circle that is the intersection of the cone with the earth is:

$$C = 2\pi R\cos\lambda$$

Now take the section of the cone from the vertex to the latitude line, cut a straight line from the vertex to the latitude, and flatten this out to two-dimensions.



Now we place a double-headed arrow on the cone to indicate the direction of the pendulum's swing. This direction is invariant in space. Thus, in 24 hours, the angle of the pendulum's swing precesses by ψ. Letting *T* be the period of the pendulum – that is the time it takes for it to return to its initial direction – we have:

$$\frac{T}{24\text{ hrs}} = \frac{2\pi}{\psi} = 2\pi\frac{L}{C} = \frac{2\pi R\cot\lambda}{2\pi R\cos\lambda} = \frac{1}{\sin\lambda}$$

$$T = \frac{24\text{ hrs}}{\sin\lambda}$$