Sidereal Period of a Satellite - Numerical Integration Solution

This ***Numerit*** application (`period4`) calculates the *sidereal* period of an Earth satellite using a gravity model that includes J_2. The sidereal period is the time interval required for a satellite to travel from one value of argument of latitude to the next identical argument of latitude value. Geometrically the argument of latitude is the angle from the ascending node, measured in the orbit plane, to the satellite's location in the orbit. Mathematically the argument of latitude is equal to the sum of the argument of perigee and true anomaly.

This computer program performs one-dimensional root-finding while numerically integrating a satellite's equations of motion. The equations of motion can be expanded to include other perturbations such as aerodynamic drag, higher-order gravity effects, third-body attractions and so forth.

The following is a draft display created with this software:

```
program period4

< sidereal period - integrated solution >

perigee altitude           1501.86 kilometers
apogee altitude            1741.86 kilometers

semimajor axis                8000 kilometers
eccentricity                 0.015
inclination                   28.5 degrees
argument of perigee            270 degrees
raan                           100 degrees
true anomaly                    30 degrees

Keplerian period        118.6846843 minutes

sidereal period         118.4516753 minutes
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