

# Catégorie:User Manual 4.3 Orbit Propagation

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## Introduction



I shall now recall to mind that the motion of the

heavenly bodies is circular, since the motion appropriate to a sphere is rotation in a circle.

*Mikołaj Kopernik (1473 - 1543)*

This section is a short presentation of the orbital tools implemented in the PATRIUS Library. The orbital tools of the PATRIUS library cover the software requirements given in **[A1]** §13,17,18,20.

## Applicable and Reference Documents

### Applicable Documents

**[A1]** *CDCF - Fonctions de Base du Patrimoine de Dynamique du Vol*, V1.2, SIRIUS-CF-DV-0049-CN, 2011.

**[A2]** *Dossier de réutilisation Orekit et Commons Math*, V1.0, SIRIUS-DLR-DV-0080-CN, 2010.

### Reference Documents

**[R1]** *Apache License*, Version 2.0, January 2004, [\[1\]](#).

## Glossary

**EGM96** Earth Gravitational Model 1996

**EIGEN** European Improved Gravity model of the Earth by New techniques

**GRACE** Gravity Recovery And Climate Experiment

**GRGS** Groupe de Recherche de Géodésie Spatiale

**ICGEM** International Centre for Global Earth Models

## Overview

The following themes are discussed in this section:

### Physical models

This chapter describes the force models available including but not limited to : central body attraction, third body attraction, atmospheric pressure, solar radiation pressure, new atmospheric models, terrestrial and ocean tides, other radiative pressure and interplanetary models. It also includes a description of the model describing the displacements of reference points due to the effect of the solid Earth tides.

### Propagation

This chapter deals with the different propagators that are available to propagate the initial state of a spacecraft. Analytical propagators are implemented (Keplerian, Eckstein-Hechler, 2D, etc.) as well as numerical ones (that are better suited to perform more accurate propagations - it is the most important part of the Patrius library) and STELA semi-analytical propagator.

### Multi Propagation

This chapter deals with the multi propagator that is available in PATRIUS to propagate several initial states. Numerical propagator is implemented.

### Ephemeris

Integrated ephemeris, Ephemeris and Lagrange ephemeris.

### Measures and data filtering

This chapter describes the basic concepts of localisation measures and orbit restitution, measure modelling and data filtering.

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