

NumericalPropagatorDOP 4.1

De Wiki

Aller à : [navigation](#), [rechercher](#)
[NumericalPropagatorDOP 4.1](#)

```
public class NumericalPropagationWithDop {  
  
    public static void main(String[] args) throws PatriusException {  
  
        // Patrius Dataset initialization (needed for example to get the UTC  
time)  
        PatriusDataset.addResourcesFromPatriusDataset() ;  
  
        // Recovery of the UTC time scale using a "factory" (not to duplicate  
such unique object)  
        final TimeScale TUC = TimeScalesFactory.getUTC();  
  
        // Date of the orbit given in UTC time scale)  
        final AbsoluteDate date = new AbsoluteDate("2010-01-01T12:00:00.000",  
TUC);  
  
        // Getting the frame with wich will defined the orbit parameters  
        // As for time scale, we will use also a "factory".  
        final Frame GCRF = FramesFactory.getGCRF();  
  
        // Initial orbit  
        final double sma = 7200.e+3;  
        final double exc = 0.01;  
        final double per = sma*(1.-exc);  
        final double apo = sma*(1.+exc);  
        final double inc = FastMath.toRadians(98.);  
        final double pa = FastMath.toRadians(0.);  
        final double raan = FastMath.toRadians(0.);  
        final double anm = FastMath.toRadians(0.);  
        final double MU = Constants.WGS84_EARTH_MU;  
  
        final ApsisRadiusParameters par = new ApsisRadiusParameters(per, apo,  
inc, pa, raan, anm, PositionAngle.MEAN, MU);  
        final Orbit iniOrbit = new ApsisOrbit(par, GCRF, date);  
  
        // We create a spacecraftstate  
        final SpacecraftState iniState = new SpacecraftState(iniOrbit);  
  
        // Initialization of the DOP integrator with a 2 s step  
//SPECIFIC  
        double minStep = 0.1;  
        double maxStep = 60.;  
        double[] absTol = { 1.e-6, 1.e-6, 1.e-6, 1.e-6, 1.e-6, 1.e-6 };  
        double[] relTol = { 1.e-8, 1.e-8, 1.e-8, 1.e-8, 1.e-8, 1.e-8 };  
    }  
}
```

```

        final FirstOrderIntegrator integrator = new
DormandPrince853Integrator(minStep, maxStep, absTol, relTol);
//SPECIFIC

        // Initialization of the propagator
        final NumericalPropagator propagator = new
NumericalPropagator(integrator);
        propagator.resetInitialState(iniState);

        // Forcing integration using cartesian equations
        propagator.setOrbitType(OrbitType.CARTESIAN);

        // Propagating 100s
        final double dt = 100.;
        final AbsoluteDate finalDate = date.shiftedBy(dt);
        final SpacecraftState finalState = propagator.propagate(finalDate);
        final Orbit finalOrbit = finalState.getOrbit();

        // Printing new date and true latitude argument
        System.out.println();
        System.out.println("Initial true latitude argument =
"+FastMath.toDegrees(iniOrbit.getLv())+" deg");
        System.out.println("New date = "+finalOrbit.getDate().toString(TUC)+"
deg");
        System.out.println("True latitude argument =
"+FastMath.toDegrees(finalOrbit.getLv())+" deg");

    }

}

```

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Menu de navigation

Outils personnels

- [18.217.10.200](#)
- [Discussion avec cette adresse IP](#)
- [Créer un compte](#)
- [Se connecter](#)

Espaces de noms

- [Page](#)
- [Discussion](#)

Variantes

Affichages

- [Lire](#)
- [Voir le texte source](#)
- [Historique](#)
- [Exporter en PDF](#)

Plus

Rechercher

PATRIUS

- [Welcome](#)

Evolutions

- [Main differences between V4.15 and V4.14](#)
- [Main differences between V4.14 and V4.13](#)
- [Main differences between V4.13 and V4.12](#)
- [Main differences between V4.12 and V4.11](#)
- [Main differences between V4.11 and V4.10](#)
- [Main differences between V4.10 and V4.9](#)
- [Main differences between V4.9 and V4.8](#)
- [Main differences between V4.8 and V4.7](#)
- [Main differences between V4.7 and V4.6.1](#)
- [Main differences between V4.6.1 and V4.5.1](#)
- [Main differences between V4.5.1 and V4.4](#)
- [Main differences between V4.4 and V4.3](#)
- [Main differences between V4.3 and V4.2](#)
- [Main differences between V4.2 and V4.1.1](#)
- [Main differences between V4.1.1 and V4.1](#)
- [Main differences between V4.1 and V4.0](#)
- [Main differences between V4.0 and V3.4.1](#)

User Manual

- [User Manual 4.15](#)

- [User Manual 4.14](#)
- [User Manual 4.13](#)
- [User Manual 4.12](#)
- [User Manual 4.11](#)
- [User Manual 4.10](#)
- [User Manual 4.9](#)
- [User Manual 4.8](#)
- [User Manual 4.7](#)
- [User Manual 4.6.1](#)
- [User Manual 4.5.1](#)
- [User Manual 4.4](#)
- [User Manual 4.3](#)
- [User Manual 4.2](#)
- [User Manual 4.1](#)
- [User Manual 4.0](#)
- [User Manual 3.4.1](#)
- [User Manual 3.3](#)

Tutorials

- [Tutorials 4.15](#)
- [Tutorials 4.14](#)
- [Tutorials 4.13.5](#)
- [Tutorials 4.12.1](#)
- [Tutorials 4.8.1](#)
- [Tutorials 4.5.1](#)
- [Tutorials 4.4](#)
- [Tutorials 4.1](#)
- [Tutorials 4.0](#)

Links

- [CNES freeware server](#)

Navigation

- [Accueil](#)
- [Modifications récentes](#)
- [Page au hasard](#)
- [Aide](#)

Outils

- [Pages liées](#)
- [Suivi des pages liées](#)
- [Pages spéciales](#)
- [Adresse de cette version](#)

- [Information sur la page](#)
- [Citer cette page](#)

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- [Politique de confidentialité](#)
- [À propos de Wiki](#)
- [Avertissements](#)

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