

ParametersConversions 4.1

De Wiki

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```
public class ParametersConversions {

    public static void main(String[] args) throws PatriusException,
    IOException, ParseException {

        // Patrius Dataset initialization (needed for example to get the UTC
time)
        PatriusDataset.addResourcesFromPatriusDataset() ;

        // Constants that will be used for conversions
        final double REQ = Constants.WGS84_EARTH_EQUATORIAL_RADIUS;
        final double MU = Constants.WGS84_EARTH_MU;

        // Initialization of keplerian parameters
        final double dga = REQ + 250.e3;
        final double exc = 0.;
        final double inc = FastMath.toRadians(45.);
        final double gom = FastMath.toRadians(10.);
        final double pom = FastMath.toRadians(0.);
        final double ano = FastMath.toRadians(180.);
        final KeplerianParameters kep = new KeplerianParameters(dga, exc,
inc, pom, gom, ano, PositionAngle.MEAN, MU);

        // Same in circular parameters
        final CircularParameters cir1 = new CircularParameters(dga,
exc*FastMath.cos(pom), exc*FastMath.sin(pom),
inc, gom, pom+ano,
PositionAngle.MEAN, MU);
        // Same in circular parameters but coming from conversion
        final CircularParameters cir2 = kep.getCircularParameters();

        // Display of potential differences
        System.out.println("TEST CIRCULAR PARAMETERS ...");
        System.out.println("Delta dga = "+(cir2.getA() - cir1.getA()));
        System.out.println("Delta ex = "+(cir2.getCircularEx() -
cir1.getCircularEx()));
        System.out.println("Delta ey = "+(cir2.getCircularEy() -
cir1.getCircularEy()));
        System.out.println("Delta inc = "+(cir2.getI() - cir1.getI()));
        System.out.println("Delta gom =
"+(cir2.getRightAscensionOfAscendingNode() -
cir1.getRightAscensionOfAscendingNode()));
        System.out.println("Delta pso = "+(cir2.getAlpha(PositionAngle.MEAN)
- cir1.getAlpha(PositionAngle.MEAN)));
    }
}
```

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// Same in equatorial parameters
final EquatorialParameters equ1 = new EquatorialParameters(dga, exc,
pom+gom,
    2.*FastMath.sin(inc/2.)*FastMath.cos(gom),
2.*FastMath.sin(inc/2.)*FastMath.sin(gom), ano, PositionAngle.MEAN, MU);
// Same in equatorial parameters but coming from conversion
final EquatorialParameters equ2 = kep.getEquatorialParameters();

// Display of potential differences
System.out.println("TEST EQUATORIAL PARAMETERS ...");
System.out.println("Delta dga = "+(equ2.getA() - equ1.getA()));
System.out.println("Delta exc = "+(equ2.getE() - equ1.getE()));
System.out.println("Delta pom = "+(equ2.getPomega() -
equ1.getPomega()));
System.out.println("Delta ix = "+(equ2.getIx() - equ1.getIx()));
System.out.println("Delta iy = "+(equ2.getIy() - equ1.getIy()));
System.out.println("Delta ano =
"+(equ2.getAnomaly(PositionAngle.MEAN) -
equ1.getAnomaly(PositionAngle.MEAN)));

// Same in equinoctial parameters
final EquinoctialParameters eqx1 = new EquinoctialParameters(dga,
exc*FastMath.cos(pom+gom), exc*FastMath.sin(pom+gom),
    FastMath.tan(inc/2.)*FastMath.cos(gom),
FastMath.tan(inc/2.)*FastMath.sin(gom), ano+pom+gom, PositionAngle.MEAN, MU);
// Same in equinoctial parameters but coming from conversion
final EquinoctialParameters eqx2 = kep.getEquinoctialParameters();

// Display of potential differences
System.out.println("TEST EQUINOCTIAL PARAMETERS ...");
System.out.println("Delta dga = "+(eqx2.getA() - eqx1.getA()));
System.out.println("Delta ex = "+(eqx2.getEquinoctialEx() -
eqx1.getEquinoctialEx()));
System.out.println("Delta ey = "+(eqx2.getEquinoctialEy() -
eqx1.getEquinoctialEy()));
System.out.println("Delta hx = "+(eqx2.getHx() - eqx1.getHx()));
System.out.println("Delta hy = "+(eqx2.getHy() - eqx1.getHy()));
System.out.println("Delta lon = "+(eqx2.getL(PositionAngle.MEAN) -
eqx1.getL(PositionAngle.MEAN)));

final double rpe = dga*(1.-exc);
final double rap = dga*(1.+exc);

// Same in apsis radius parameters
final ApsisRadiusParameters apr1 = new ApsisRadiusParameters(rpe,
rap, inc, pom, gom, ano, PositionAngle.MEAN, MU);
// Same in apsis radius parameters but coming from conversion
final ApsisRadiusParameters apr2 = kep.getApsisRadiusParameters();

// Display of potential differences

```

```

        System.out.println("TEST APSIS RADIUS PARAMETERS ...");
        System.out.println("Delta rpe = "+(apr2.getPeriapsis() -
apr1.getPeriapsis()));
        System.out.println("Delta rap = "+(apr2.getApoapsis() -
apr1.getApoapsis()));
        System.out.println("Delta inc = "+(apr2.getI() - apr1.getI()));
        System.out.println("Delta pom = "+(apr2.getPerigeeArgument() -
apr1.getPerigeeArgument()));
        System.out.println("Delta gom =
"+(apr2.getRightAscensionOfAscendingNode() -
apr1.getRightAscensionOfAscendingNode()));
        System.out.println("Delta ano =
"+(apr2.getAnomaly(PositionAngle.MEAN) -
apr1.getAnomaly(PositionAngle.MEAN)));

        // Same in apsis altitude
        final ApsisAltitudeParameters apa1 = new
ApsisAltitudeParameters(rpe-REQ, rap-REQ, inc, pom, gom, ano,
PositionAngle.MEAN, MU, REQ);
        // Same in apsis altitude parameters but coming from conversion
        final ApsisAltitudeParameters apa2 =
kep.getApsisAltitudeParameters(REQ);

        // Display of potential differences
        System.out.println("TEST APSIS ALTITUDE PARAMETERS ...");
        System.out.println("Delta hpe = "+(apa2.getPeriapsisAltitude() -
apa1.getPeriapsisAltitude()));
        System.out.println("Delta hap = "+(apa2.getApoapsisAltitude() -
apa1.getApoapsisAltitude()));
        System.out.println("Delta inc = "+(apa2.getI() - apa1.getI()));
        System.out.println("Delta pom = "+(apa2.getPerigeeArgument() -
apa1.getPerigeeArgument()));
        System.out.println("Delta gom =
"+(apa2.getRightAscensionOfAscendingNode() -
apa1.getRightAscensionOfAscendingNode()));
        System.out.println("Delta ano =
"+(apa2.getAnomaly(PositionAngle.MEAN) -
apa1.getAnomaly(PositionAngle.MEAN)));
    }
}

```

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