User Manual 3.4.1 Multi events detection

Introduction

Scope

Here are presented all the multi events detectors that could be used in multi propagation.

Javadoc

Those event detectors are available in the packages :

Library	Javadoc
Orekit	[Package org.orekit.propagation.event](#)
Patrius	[Package fr.cnes.sirius.patrius.events](#)

Links

See :

- [Multi propagation chapter](#)
- [Events detection introduction chapter](#)

Useful Documents

None as of now.

Package Overview

None as of now.

Features Description

Multi events detectors

The following events detectors could be used in mono and multi spacecraft propagation :

- [ThreeBodiesAngleDetector](#)
- [ExtremaThreeBodiesAngleDetector](#)
- [SatToSatMutualVisibilityDetector](#)

These three detectors extends [AbstractDetector](#) and implements [MultiEventDetector](#).

Using [multi numerical propagator](#), all states concerned by the detection are recovered from the global state vector. Using one of the [mono propagator](#) (analytical or numerical), the main state is recovered from the propagation. The others states concerned by the detection are recovered from a

PVCoordinatesProvider.

The meaning of the g switching function for the concerned event detectors, and their particularities are presented in dedicated chapter :

- [Orbit determination events chapter](#) for [ThreeBodiesAngleDetector](#) and [ExtremaThreeBodiesAngleDetector](#)
- [Ground stations and satellites events](#) for [SatToSatMutualVisibilityDetector](#)

Using multi events detectors

In multi numerical propagation case, the states concerned by the detection are identified with their ID. Specific constructors should be used in multi numerical propagation case. These constructors take as parameter the ID of states concerned by the detection.

Here after is presented the instanciation of a SatToSatMutualVisibilityDetectorin multi propagation case :

```
// Initialize multi numerical propagator
final FirstOrderIntegrator integratorMultiSat = new
DormandPrince853Integrator(.1, 60, 1e-9, 1e-9);
MultiNumericalPropagator mainPropagator = new
MultiNumericalPropagator(integratorMultiSat);
mainPropagator.addInitialState(mainState, STATE1);
mainPropagator.addInitialState(secondaryState, STATE2);
mainPropagator.setAttitudeProvider(attitudeProv, STATE1);
mainPropagator.setAttitudeProvider(attitudeProv, STATE2);

// Create SatToSatMultualVisibilityDetector
final MultiEventDetector detector = new
SatToSatMutualVisibilityDetector(STATE1, STATE2, mainSpacecraftSensorModel1,
secondarySpacecraftSensorModel2, false, 0.01, 10.e-10);

// Add detector
mainPropagator.addEventDetector(detector1);

// propagate
Map<String, SpacecraftState> endStates =
mainPropagator.propagate(date.shiftedBy(duration));
```

If a wrong constructor is used, i.e a constructor for mono propagation, an exception will be raised during propagation.

Getting Started

None as of now.

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Interfaces

Interface	Summary	Javadoc
EventDetector	This interface represents an event finder.	[EventDetector](#)
MultiEventDetector	This interface represents an event finder in multi propagation case.	[MultiEventDetector](#)

Classes

Class	Summary	Javadoc
ThreeBodiesAngleDetector	This class handles events representing the reaching of a predetermined angle between three bodies.	[ThreeBodiesAngleDetector](#)
ExtremaThreeBodiesAngleDetector	This class handles events representing the reaching of of extrema for the angle between three bodies.	[ExtremaThreeBodiesAngleDetector](#)
SatToSatMutualVisibilityDetector	This class handles events representing the mutual visibility between two spacecraft's sensors.	[SatToSatMutualVisibilityDetector](#)

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Tutorials

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