PPD File format

From DirsigWiki

Contents

Overview

The platform position file (ppd) describes position and orientation as a function of time. This information is given for one or more discrete times and then interpolated by DIRSIG as needed. The file is XML-formatted which makes it easier and more reliable to parse and allows the data to be authored and viewed in other software packages.

A complete example PPD file follows:

```
<platformmotion type="generic">
  <method type="raw" />

  <data rotationframe="sceneenu" rotationorder="xyz" angletype="absolute"
        angularunits="radians" spatialunits="meters">
    <entry>
       <datetime type="relative">0</datetime>
      <position>
        <scenelocation>
           <point><x>600</x><y>600</y><z>1200</z></point>
        </scenelocation>
      </position>

      <orientation>
        <eulerangles>
           <cartesiantriple><x>0</x><y>0</y><z>4.71239</z></cartesiantriple>
        </eulerangles>
      </orientation>
    </entry>
  </data>
</platformmotion>
```

The `method` attribute indicates the format of the ppd data. Only the "raw" method is currently supported, where the user supplies key frame style position and orientation information.

The `data` element provides units, conventions, and coordinate-frame information about the position/orientation entries. The following table describes the available attributes:

Attribute	Description
rotationframe	The reference frame for orientation vectors. The scene-based East-North-Up ("sceneenu"), platform-based East-North-Up ("platformenu"), and Earth-Centered, Earth-Fixed ("ecef") frames are supported.
rotationorder	The order in which `orientation` Euler rotations are applied. The order "xyz" indicates to first rotate around the x-axis, then the y-axis, then the z-axis. Arbitrary combinations of the three axes are allowed, such as "zyx" and "yxz".
angletype	Currently only "absolute" is allowed, which indicates that orientation Euler rotations are relative to the vectors (0,0,-1) and (0,1,0) in the specified "rotationframe".
angularunits	The units used for rotations. Only "radians" are supported.
spatialunits	The units used for local-coordinate positioning. Only "meters" are supported.

Inside the `data` element are one or more `entry` elements. Each describes the platform's position and orientation for a specific time, using a `datetime`, `position`, and `orientation` subelement. An example entry follows:

```
<entry>
   <datetime type="relative">0</datetime>
  <position>
    <scenelocation>
       <point><x>600</x><y>600</y><z>1200</z></point>
    </scenelocation>
  </position>

  <orientation>
    <eulerangles>
       <cartesiantriple><x>0</x><y>0</y><z>4.71239</z></cartesiantriple>
    </eulerangles>
  </orientation>
</entry>
```

This entry indicates that at time 0 [sec] after the simulation reference time (supplied in XML tasks file), the platform is located at scene coordinate (600,600,1200) [m], heading east.

In this example, the `position` element is specifying the platform location in local scene coordinates. It is also possible to use geolocated coordinates. The following syntax places the platform at 43.12 North, 78.44 West with an altitude of 1500 [m] above the WGS84 ellipsoid. (The `sceneorigin` in the XML scene file geolocates the local scene coordinate system).

```
  <position>
    <geodeticlocation>
      <latitude>   43.125399442567272</latitude>
      <longitude> -78.442628428773205</longitude>
      <altitude> 1500.0607548691332</altitude>
    </geodeticlocation>
  </position>
```

Position

There are multiple methods of specifying platform location:

- Cartesian coordinates in the scene-based ENU frame
- Cartesian coordinates in the ECEF frame
- Geodetic coordinates (latitude, longitude, height above WGS84 ellipsoid)
- UTM coordinates

Examples of each method follow:

Scene ENU

```
<position>
  <scenelocation>
     <point><x>600</x><y>600</y><z>1200</z></point>
  </scenelocation>
</position>
```

ECEF

```
<position>
  <eceflocation>
     <point><x>6378537</x><y>0</y><z>0</z></point>
  </eceflocation>
</position>
```

Geodetic

```
<position>
  <geodeticlocation>
     <latitude>   43.125399442567272</latitude>
     <longitude> -78.442628428773205</longitude>
     <altitude> 1500.0607548691332</altitude>
  </geodeticlocation>
</position>
```

UTM

```
<position>
  <utmlocation>
    <zone>18</zone>
    <hemisphere>N</hemisphere>
    <easting>4782510</easting>
    <northing>287718</northing>
    <altitude>1500.0</altitude>
  </utmlocation>
</position>
```

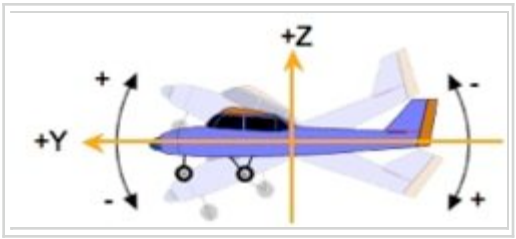
Orientation

The `orientation` element describes how to transform the platform's pointing vector which starts at (0,0,-1) and its orientation vector which starts at (0,1,0). These initial vectors are in the reference frame specified by the "rotationframe" in the data section. Internally, the transformed orientation vector is then automatically converted to DIRSIG's local ENU coordinate system.

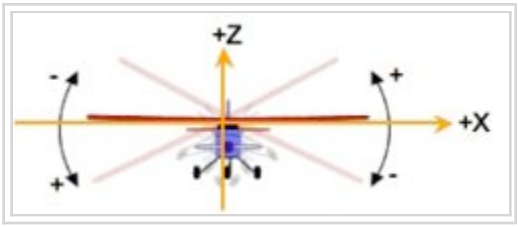
With the Earth-Centered, Earth-Fixed (ECEF) coordinate frame: the origin is at the Earth's mass center, the +X axis points to latitude zero and longitude zero, the +Z axis points to the North pole, the +Y axis goes through latitude zero and longitude ninety degrees.

With the East-North-Up (ENU) coordinate frame: the +X axis is East, the +Y axis is North, the +Z axis is up. This means the default platform heading is North. The following figures illustrate the resulting sign conventions when using an aircraft as the reference platform:

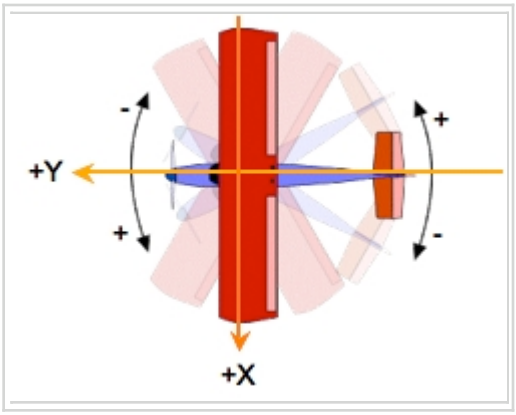
Sign Conventions for Aircraft



X-Axis Rotation (pitch)



Y-Axis Rotation (roll)



Z-Axis Rotation (yaw)

Complete Example

A complete, geolocated platform position follows:

```
<platformmotion type="generic">
  <method type="raw" />

  <data rotationframe="sceneenu" rotationorder="xyz" angletype="absolute"
        angularunits="radians" spatialunits="meters">
    <entry>
       <datetime type="relative">0</datetime>
      <position>
        <geodeticlocation>
          <latitude>   43.125399442567272</latitude>
          <longitude> -78.442628428773205</longitude>
          <altitude> 1500.0607548691332</altitude>
        </geodeticlocation>
      </position>

      <orientation>
        <eulerangles>
           <cartesiantriple><x>0</x><y>0</y><z>4.71239</z></cartesiantriple>
        </eulerangles>
      </orientation>
    </entry>
  </data>
</platformmotion>
```


- This page was last modified 18:16, 31 October 2008.