
oem

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The primary interface between the *oem* package and OEM files is the *OrbitalEphemerisMessage* class. In addition, the package provides objects to represent each component of an OEM ephemeris.

OrbitalEphemerisMessage

See also:

Module *Ephemeris Components*

Module *OEM Data Types*

Python representation of an Orbital Ephemeris Message.

This class provides the primary interface between the OEM module and an OEM file.

`oem.OrbitalEphemerisMessage.header`
Object containing the OEM header section.

Type *HeaderSection*

Examples

The *OrbitalEphemerisMessage* class can load directly from a file:

```
>>> ephemeris = OrbitalEphemerisMessage.from_ascii_oem(file_path)
```

An OEM is made up of one or more data segments available through an iterator:

```
>>> for segment in ephemeris:
...     for state in segment:
...         # Iterate through states
...         pass
...     for covariance in segment.covariances:
...         # Iterate through covariances
...         pass
```

It is also possible to iterate through the states and covariances in all segments with the *.states* and *.covariances* properties.

To determine if a particular epoch is contained in the useable time range of any of the segments in an ephemeris, use *in*:

```
>>> epoch in ephemeris
True
```

`oem.OrbitalEphemerisMessage.covariances`
Return a list of covariances in all segments.

`oem.OrbitalEphemerisMessage.states`
Return a list of states in all segments.

Ephemeris Components

See also:

Module *OrbitalEphemerisMessage*

Module *OEM Data Types*

2.1 EphemerisSegment

class oem.components.**EphemerisSegment** (*metadata, state_data, covariance_data=None, version='2.0'*)

Bases: object

OEM ephemeris segment.

Container for a single OEM ephemeris segment.

covariances

Return list of Covariances in this segment.

classmethod from_strings (*components, version='2.0'*)

Create EphemerisSegment from OEM segment strings.

Parameters components (*tuple*) – Tuple of OEM-formatted strings containing metadata, ephemeris data, and an optional covariance section.

Returns New EphemerisSegment instance.

Return type new_section (*EphemerisSegment*)

has_accel

Evaluate if segment contains acceleration data.

has_covariance

Evaluate if segment contains covariance data.

states

Return list of States in this segment.

useable_start_time

Return epoch of start of useable state data range

useable_stop_time

Return epoch of end of useable state data range

2.2 HeaderSection

class oem.components.**HeaderSection** (*fields*)

Bases: oem.base.KeyValueSection

OEM header section.

Container for a single OEM header section.

Examples

This class behaves similar to a dict allowing membership checks, iteration over keys, and value set/get.

```
>>> "CCSDS_OEM_VERS" in header:
True
```

```
>>> keys = [key for key in header]
```

```
>>> metadata["ORIGINATOR"] = 'ORIG_NAME'
```

```
>>> metadata["ORIGINATOR"]
'ORIG_NAME'
```

classmethod **from_string** (*segment*)

Create Header Section from OEM-formatted string.

Parameters **segment** (*str*) – String containing a single OEM header section.

Returns New HeaderSection instance.

Return type new_section (*HeaderSection*)

version

2.3 MetaDataSection

class oem.components.**MetaDataSection** (*metadata, version='2.0'*)

Bases: oem.base.KeyValueSection

OEM metadata section.

Container for a single OEM metadata section.

Examples

This class behaves similar to a dict allowing membership checks, iteration over keys, and value set/get.

```
>>> "OBJECT_NAME" in metadata:
True
```

```
>>> keys = [key for key in metadata]
```

```
>>> metadata["CENTER_NAME"] = 'Mars'
```

```
>>> metadata["CENTER_NAME"]
'Mars'
```

classmethod from_string (*segment*, *version*)

Create MetaDataSection from OEM-formatted string.

Parameters **segment** (*str*) – String containing a single OEM metadata section.

Returns New MetaDataSection instance.

Return type new_section (*MetaDataSection*)

useable_start_time

Return epoch of start of useable state data range

useable_stop_time

Return epoch of end of useable state data range

2.4 DataSection

class oem.components.**DataSection** (*states*, *version*='2.0')

Bases: object

OEM data section.

Container for a single OEM ephemeris state data section.

classmethod from_string (*segment*, *version*)

Create DataSection from OEM-formatted string.

Parameters **segment** (*str*) – String containing a single OEM data section.

Returns New DataSection instance.

Return type new_section (*DataSection*)

has_accel

Evaluate if section contains acceleration data.

states

Return a list of States in this section.

2.5 CovarianceSection

class oem.components.**CovarianceSection** (*covariances*, *version*='2.0')

Bases: object

OEM covariance section.

Container for a single OEM covariance section.

covariances

Return a list of covariances in this section.

classmethod from_string (*segment, version*)

Create CovarianceSection from OEM-formatted string.

Parameters **segment** (*str*) – String containing a single OEM covariance section.

Returns New CovarianceSection instance.

Return type new_section (*CovarianceSection*)

See also:Module *OrbitalEphemerisMessage*Module *Ephemeris Components*

3.1 State

class `oem.components.State` (*epoch, position, velocity, acceleration=None, version='2.0'*)Bases: `object`

Basic Cartesian state.

epoch

Epoch date and time.

Type `DateTime`**position**

3-element array describing the position at epoch.

Type `ndarray`**velocity**

3-element array describing the velocity at epoch.

Type `ndarray`**acceleration**3-element array describing the acceleration at epoch. If unavailable, this attribute is `None`.**Type** `ndarray`**classmethod** `from_string` (*segment, version*)

Create State from OEM-formatted string.

Parameters `segment` (*str*) – String containing a single OEM state line.

Returns New State instance.

Return type `new_state` (*State*)

3.2 Covariance

class `oem.components.Covariance` (*epoch, frame, matrix, version='2.0'*)

Bases: `object`

Basic 6x6 covariance.

epoch

Epoch date and time.

Type `DateTime`

frame

Reference from of this covariance.

Type `str`

matrix

6x6 covariance matrix.

Type `ndarray`

classmethod `from_string` (*segment, version*)

Create Covariance from OEM-formatted string.

Parameters `segment` (*str*) – String containing a single OEM covariance block.

Returns New Covariance instance.

Return type `new_covariance` (*Covariance*)

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