

# PlanetFixedModel

5.1

Generated by Doxygen 1.8.5

Mon Jul 31 2023 11:42:51



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# Chapter 1

## Module Index

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# Namespace Index

### 2.1 Namespace List

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## Chapter 3

# Hierarchical Index

### 3.1 Class Hierarchy

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## Chapter 6

# Module Documentation

### 6.1 Models

#### Modules

- [Utils](#)

#### 6.1.1 Detailed Description

## 6.2 Utils

### Modules

- [PlanetFixed](#)

### 6.2.1 Detailed Description

## 6.3 PlanetFixed

### Modules

- [NorthEastDown](#)
- [PlanetFixedPosn](#)

### 6.3.1 Detailed Description

## 6.4 NorthEastDown

### Files

- file [north\\_east\\_down.hh](#)  
*Implementation of the North-East-Down reference frame.*
- file [north\\_east\\_down.cc](#)  
*NorthEastDown class methods.*

### Namespaces

- [jeod](#)  
*Namespace jeod.*

#### 6.4.1 Detailed Description

## 6.5 PlanetFixedPosn

### Files

- file [alt\\_lat\\_long\\_state.hh](#)  
*Basic orthogonal Altitude-Latitude-Longitude state definition.*
- file [class\\_declarations.hh](#)  
*Forward declarations of classes defined in planet-fixed position model header files.*
- file [planet\\_fixed\\_messages.hh](#)  
*Define the class PlanetFixedMessages, the class that specifies the message IDs used in the planet-fixed model.*
- file [planet\\_fixed\\_posn.hh](#)  
*Planet centered fixed position model: alternate coordinate system definitions and transformations to those coordinate systems.*
- file [alt\\_lat\\_long\\_state.cc](#)  
*AltLatLongState class methods.*
- file [planet\\_fixed\\_messages.cc](#)  
*Implement the class PlanetFixedMessages.*
- file [planet\\_fixed\\_posn.cc](#)  
*Define PlanetFixedPosition class methods.*

### Namespaces

- [jeod](#)  
*Namespace jeod.*

### Macros

- `#define PATH "environment/planet_fixed/"`

#### 6.5.1 Detailed Description

#### 6.5.2 Macro Definition Documentation

##### 6.5.2.1 `#define PATH "environment/planet_fixed/"`

Definition at line 38 of file planet\_fixed\_messages.cc.



## Chapter 7

# Namespace Documentation

### 7.1 jeod Namespace Reference

Namespace jeod.

#### Data Structures

- class [NorthEastDown](#)  
*Defines a local North-East-Down reference frame.*
- class [AltLatLongState](#)  
*Specifies positional state in planetary altitude, latitude, and longitude.*
- class [PlanetFixedMessages](#)  
*Specifies the message IDs used in the gravity model.*
- class [PlanetFixedPosition](#)  
*Contains various representations of position with respect to a planet.*

#### 7.1.1 Detailed Description

Namespace jeod.





## Chapter 8

# Data Structure Documentation

### 8.1 jeod::AltLatLongState Class Reference

Specifies positional state in planetary altitude, latitude, and longitude.

```
#include <alt_lat_long_state.hh>
```

#### Public Member Functions

- [AltLatLongState](#) ()  
*Construct an [AltLatLongState](#) object.*
- virtual [~AltLatLongState](#) ()  
*Destructor.*
- void [set\\_data](#) (double alt, double lat, double lon)  
*Allow user to set member data.*
- void [get\\_data](#) (double &alt, double &lat, double &lon)  
*Allow user to get member data.*

#### Data Fields

- double [altitude](#)  
*An object's height above the reference surface of the local [GravBody](#).*
- double [latitude](#)  
*An object's north-south angular offset from the local [GravBody](#)'s reference equator.*
- double [longitude](#)  
*An object's east-west angular offset from the local [GravBody](#)'s reference prime meridian.*

#### Friends

- class [InputProcessor](#)
- void [init\\_attrjeod\\_\\_AltLatLongState](#) ()

#### 8.1.1 Detailed Description

Specifies positional state in planetary altitude, latitude, and longitude.

Definition at line 77 of file [alt\\_lat\\_long\\_state.hh](#).

## 8.1.2 Constructor & Destructor Documentation

### 8.1.2.1 jeod::AltLatLongState::AltLatLongState ( void )

Construct an [AltLatLongState](#) object.

Definition at line 38 of file alt\_lat\_long\_state.cc.

References altitude, latitude, and longitude.

### 8.1.2.2 virtual jeod::AltLatLongState::~AltLatLongState ( ) [inline],[virtual]

Destructor.

Definition at line 111 of file alt\_lat\_long\_state.hh.

## 8.1.3 Member Function Documentation

### 8.1.3.1 void jeod::AltLatLongState::get\_data ( double & alt\_out, double & lat\_out, double & lon\_out )

Allow user to get member data.

Parameters

out	<i>alt_out</i>	Altitude Units: M
out	<i>lat_out</i>	Longitude Units: r
out	<i>lon_out</i>	Latitude Units: r

Definition at line 71 of file alt\_lat\_long\_state.cc.

References altitude, latitude, and longitude.

### 8.1.3.2 void jeod::AltLatLongState::set\_data ( double alt, double lat, double lon )

Allow user to set member data.

Parameters

in	<i>alt</i>	Altitude Units: M
in	<i>lat</i>	Longitude Units: r
in	<i>lon</i>	Latitude Units: r

Definition at line 53 of file alt\_lat\_long\_state.cc.

References altitude, latitude, and longitude.

Referenced by jeod::PlanetFixedPosition::update\_from\_ellip(), and jeod::PlanetFixedPosition::update\_from\_spher().

## 8.1.4 Friends And Related Function Documentation

### 8.1.4.1 void init\_attrjeod\_\_AltLatLongState ( ) [friend]

### 8.1.4.2 friend class InputProcessor [friend]

Definition at line 79 of file alt\_lat\_long\_state.hh.

## 8.1.5 Field Documentation

### 8.1.5.1 double jeod::AltLatLongState::altitude

An object's height above the reference surface of the local GravBody.

trick\_units(m)

Definition at line 88 of file alt\_lat\_long\_state.hh.

Referenced by AltLatLongState(), jeod::PlanetFixedPosition::cart\_to\_ellip(), jeod::PlanetFixedPosition::cart\_to\_spher(), jeod::PlanetFixedPosition::ellip\_to\_cart(), get\_data(), set\_data(), jeod::PlanetFixedPosition::spher\_to\_cart(), jeod::PlanetFixedPosition::update\_from\_ellip(), and jeod::PlanetFixedPosition::update\_from\_spher().

### 8.1.5.2 double jeod::AltLatLongState::latitude

An object's north-south angular offset from the local GravBody's reference equator.

trick\_units(rad)

Definition at line 94 of file alt\_lat\_long\_state.hh.

Referenced by AltLatLongState(), jeod::NorthEastDown::build\_ned\_orientation(), jeod::PlanetFixedPosition::cart\_to\_ellip(), jeod::PlanetFixedPosition::cart\_to\_spher(), jeod::PlanetFixedPosition::ellip\_to\_cart(), get\_data(), set\_data(), jeod::PlanetFixedPosition::spher\_to\_cart(), jeod::PlanetFixedPosition::update\_from\_ellip(), and jeod::PlanetFixedPosition::update\_from\_spher().

### 8.1.5.3 double jeod::AltLatLongState::longitude

An object's east-west angular offset from the local GravBody's reference prime meridian.

trick\_units(rad)

Definition at line 100 of file alt\_lat\_long\_state.hh.

Referenced by AltLatLongState(), jeod::NorthEastDown::build\_ned\_orientation(), jeod::PlanetFixedPosition::cart\_to\_ellip(), jeod::PlanetFixedPosition::cart\_to\_spher(), jeod::PlanetFixedPosition::ellip\_to\_cart(), get\_data(), set\_data(), jeod::PlanetFixedPosition::spher\_to\_cart(), jeod::PlanetFixedPosition::update\_from\_ellip(), and jeod::PlanetFixedPosition::update\_from\_spher().

The documentation for this class was generated from the following files:

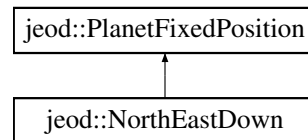
- [alt\\_lat\\_long\\_state.hh](#)
- [alt\\_lat\\_long\\_state.cc](#)

## 8.2 jeod::NorthEastDown Class Reference

Defines a local North-East-Down reference frame.

```
#include <north_east_down.hh>
```

Inheritance diagram for jeod::NorthEastDown:



## Public Types

- enum [AltLatLongType](#) { `undefined` = -1, `spherical`, `elliptical` }  
*Specifies whether the latitude is spherical or elliptical.*

## Public Member Functions

- [NorthEastDown](#) ()  
*NorthEastDown constructor.*
- [~NorthEastDown](#) () override  
*NorthEastDown destructor.*
- void [update\\_from\\_cart](#) (double const cart[3]) override  
*Update from Cartesian position input.*
- void [update\\_from\\_spher](#) (const [AltLatLongState](#) &spher) override  
*Update from Spherical position input.*
- void [update\\_from\\_ellip](#) (const [AltLatLongState](#) &ellip) override  
*Update from Elliptical position input.*
- virtual void [build\\_ned\\_orientation](#) ()  
*Build NED frame state based on current reference point information.*
- virtual void [set\\_ned\\_trans\\_states](#) (const double pos[3], const double vel[3])  
*Build NED frame state based on current reference point information.*

## Data Fields

- RefFrame [ned\\_frame](#)  
*The local North-East-Down reference frame, centered at the reference point stored in the `ellip_coords`, `sphere_coords`, and `cart_coords` data fields inherited from [PlanetFixedPosition](#).*
- [AltLatLongType](#) [altlatlong\\_type](#)  
*Is reference point specified in spherical or elliptical coords?*

## Private Member Functions

- [NorthEastDown](#) (const [NorthEastDown](#) &rhs)
- [NorthEastDown](#) & [operator=](#) (const [NorthEastDown](#) &)

## Friends

- class [InputProcessor](#)
- void [init\\_attrjeod\\_\\_NorthEastDown](#) ()

## Additional Inherited Members

### 8.2.1 Detailed Description

Defines a local North-East-Down reference frame.

Definition at line 81 of file north\_east\_down.hh.

### 8.2.2 Member Enumeration Documentation

#### 8.2.2.1 enum jeod::NorthEastDown::AltLatLongType

Specifies whether the latitude is spherical or elliptical.

Enumerator

*undefined*  
*spherical*  
*elliptical*

Definition at line 100 of file north\_east\_down.hh.

### 8.2.3 Constructor & Destructor Documentation

#### 8.2.3.1 jeod::NorthEastDown::NorthEastDown ( void )

[NorthEastDown](#) constructor.

Definition at line 50 of file north\_east\_down.cc.

References [altlatlong\\_type](#), and [undefined](#).

#### 8.2.3.2 jeod::NorthEastDown::~~NorthEastDown ( void ) [override]

[NorthEastDown](#) destructor.

Definition at line 60 of file north\_east\_down.cc.

#### 8.2.3.3 jeod::NorthEastDown::NorthEastDown ( const NorthEastDown & rhs ) [private]

### 8.2.4 Member Function Documentation

#### 8.2.4.1 void jeod::NorthEastDown::build\_ned\_orientation ( void ) [virtual]

Build NED frame state based on current reference point information.

Definition at line 115 of file north\_east\_down.cc.

References [altlatlong\\_type](#), [jeod::PlanetFixedPosition::ellip\\_coords](#), [elliptical](#), [jeod::PlanetFixedMessages::invalid\\_request](#), [jeod::AltLatLongState::latitude](#), [jeod::AltLatLongState::longitude](#), [ned\\_frame](#), [jeod::PlanetFixedPosition::sphere\\_coords](#), and [spherical](#).

#### 8.2.4.2 NorthEastDown& jeod::NorthEastDown::operator= ( const NorthEastDown & ) [private]

#### 8.2.4.3 void jeod::NorthEastDown::set\_ned\_trans\_states ( const double pos[3], const double vel[3] ) [virtual]

Build NED frame state based on current reference point information.

**Parameters**

in	<i>pos</i>	Cartesian position, PCPF Units: M
in	<i>vel</i>	Cartesian velocity, PCPF Units: M/s

Definition at line 168 of file north\_east\_down.cc.

References ned\_frame, and jeod::PlanetFixedPosition::update\_from\_cart().

**8.2.4.4** void jeod::NorthEastDown::update\_from\_cart ( double const *cart*[3] ) [override],[virtual]

Update from Cartesian position input.

**Parameters**

in	<i>cart</i>	Cartesian coords, PCPF Units: M
----	-------------	------------------------------------

Reimplemented from [jeod::PlanetFixedPosition](#).

Definition at line 71 of file north\_east\_down.cc.

References jeod::PlanetFixedPosition::cart\_coords, ned\_frame, and jeod::PlanetFixedPosition::update\_from\_cart().

**8.2.4.5** void jeod::NorthEastDown::update\_from\_ellip ( const AltLatLongState & *ellip* ) [override],[virtual]

Update from Elliptical position input.

**Parameters**

in	<i>ellip</i>	Elliptical AltLatLong position
----	--------------	--------------------------------

Reimplemented from [jeod::PlanetFixedPosition](#).

Definition at line 101 of file north\_east\_down.cc.

References jeod::PlanetFixedPosition::cart\_coords, ned\_frame, and jeod::PlanetFixedPosition::update\_from\_ellip().

**8.2.4.6** void jeod::NorthEastDown::update\_from\_spher ( const AltLatLongState & *spher* ) [override],[virtual]

Update from Spherical position input.

**Parameters**

in	<i>spher</i>	Spherical AltLatLong position
----	--------------	-------------------------------

Reimplemented from [jeod::PlanetFixedPosition](#).

Definition at line 86 of file north\_east\_down.cc.

References jeod::PlanetFixedPosition::cart\_coords, ned\_frame, and jeod::PlanetFixedPosition::update\_from\_spher().

**8.2.5 Friends And Related Function Documentation**

**8.2.5.1** void init\_attrjeod\_\_NorthEastDown ( ) [friend]

### 8.2.5.2 friend class InputProcessor [friend]

Definition at line 83 of file north\_east\_down.hh.

## 8.2.6 Field Documentation

### 8.2.6.1 AltLatLongType jeod::NorthEastDown::altlatlong\_type

Is reference point specified in spherical or elliptical coords?

trick\_units(-)

Definition at line 117 of file north\_east\_down.hh.

Referenced by build\_ned\_orientation(), and NorthEastDown().

### 8.2.6.2 RefFrame jeod::NorthEastDown::ned\_frame

The local North-East-Down reference frame, centered at the reference point stored in the ellip\_coords, sphere\_coords, and cart\_coords data fields inherited from [PlanetFixedPosition](#).

trick\_units(-)

Definition at line 94 of file north\_east\_down.hh.

Referenced by build\_ned\_orientation(), set\_ned\_trans\_states(), update\_from\_cart(), update\_from\_ellip(), and update\_from\_spher().

The documentation for this class was generated from the following files:

- [north\\_east\\_down.hh](#)
- [north\\_east\\_down.cc](#)

## 8.3 jeod::PlanetFixedMessages Class Reference

Specifies the message IDs used in the gravity model.

```
#include <planet_fixed_messages.hh>
```

### Static Public Attributes

- static char const \* [invalid\\_request](#) = "environment/planet\_fixed/" "invalid\_request"  
*Issued when a selection such as an enum value is invalid.*
- static char const \* [domain\\_error](#) = "environment/planet\_fixed/" "domain\_error"  
*Issued when a value is invalid such as an overly small radius.*

### Private Member Functions

- [PlanetFixedMessages](#) (void)
- [PlanetFixedMessages](#) (const [PlanetFixedMessages](#) &)
- [PlanetFixedMessages](#) & operator= (const [PlanetFixedMessages](#) &)

### Friends

- class [InputProcessor](#)
- void [init\\_attrjeod\\_\\_PlanetFixedMessages](#) ()

### 8.3.1 Detailed Description

Specifies the message IDs used in the gravity model.

Definition at line 85 of file planet\_fixed\_messages.hh.

### 8.3.2 Constructor & Destructor Documentation

8.3.2.1 `jeod::PlanetFixedMessages::PlanetFixedMessages ( void ) [private]`

8.3.2.2 `jeod::PlanetFixedMessages::PlanetFixedMessages ( const PlanetFixedMessages & ) [private]`

### 8.3.3 Member Function Documentation

8.3.3.1 `PlanetFixedMessages& jeod::PlanetFixedMessages::operator= ( const PlanetFixedMessages & ) [private]`

### 8.3.4 Friends And Related Function Documentation

8.3.4.1 `void init_attrjeod__PlanetFixedMessages ( ) [friend]`

8.3.4.2 `friend class InputProcessor [friend]`

Definition at line 88 of file planet\_fixed\_messages.hh.

### 8.3.5 Field Documentation

8.3.5.1 `char const * jeod::PlanetFixedMessages::domain_error = "environment/planet_fixed/" "domain_error" [static]`

Issued when a value is invalid such as an overly small radius.

`trick_units(-)`

Definition at line 102 of file planet\_fixed\_messages.hh.

Referenced by `jeod::PlanetFixedPosition::cart_to_ellip()`, and `jeod::PlanetFixedPosition::cart_to_spher()`.

8.3.5.2 `char const * jeod::PlanetFixedMessages::invalid_request = "environment/planet_fixed/" "invalid_request" [static]`

Issued when a selection such as an enum value is invalid.

`trick_units(-)`

Definition at line 97 of file planet\_fixed\_messages.hh.

Referenced by `jeod::NorthEastDown::build_ned_orientation()`.

The documentation for this class was generated from the following files:

- [planet\\_fixed\\_messages.hh](#)
- [planet\\_fixed\\_messages.cc](#)

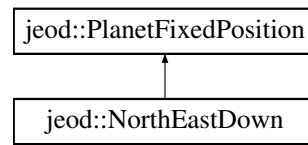
## 8.4 jeod::PlanetFixedPosition Class Reference

Contains various representations of position with respect to a planet.

```
#include <planet_fixed_posn.hh>
```



Inheritance diagram for jeod::PlanetFixedPosition:



## Public Member Functions

- [PlanetFixedPosition](#) ()  
Construct a *PlanetFixedPosition* object.
- virtual [~PlanetFixedPosition](#) ()  
Destructor.
- virtual void [initialize](#) (Planet \*planet\_in)  
Initialize a *PlanetFixedPosition* object.
- virtual void [update\\_from\\_cart](#) (const double cart[3])  
Update from Cartesian position input.
- virtual void [update\\_from\\_spher](#) (const [AltLatLongState](#) &spher)  
Update from Spherical position input.
- virtual void [update\\_from\\_ellip](#) (const [AltLatLongState](#) &ellip)  
Update from Elliptical position input.

## Data Fields

- [AltLatLongState](#) [ellip\\_coords](#)  
An object's current position in elliptical coordinates.
- [AltLatLongState](#) [sphere\\_coords](#)  
The same object's current position in spherical coordinates.
- double [cart\\_coords](#) [3]  
The planet-centered, planet-fixed position of the object.
- Planet \* [planet](#)  
The planet currently associated with this.

## Static Public Attributes

- static const double [Small\\_radius\\_limit](#) = 1e-60  
Limit of ratio of radial distance to planet equatorial radius below which planetary coordinates are deemed to be invalid.

## Protected Member Functions

- void [cart\\_to\\_spher](#) ()  
Convert from cartesian to spherical position.
- void [cart\\_to\\_ellip](#) ()  
Convert from cartesian to elliptical position.
- void [spher\\_to\\_cart](#) ()  
Convert from spherical to cartesian position.
- void [ellip\\_to\\_cart](#) ()  
Convert from elliptical to cartesian position.
- int [get\\_elliptic\\_parameters](#) (double r, double z, double &f, double &h, int maxIters=10)

## Friends

- class [InputProcessor](#)
- void [init\\_attrjeod\\_\\_PlanetFixedPosition](#) ()

### 8.4.1 Detailed Description

Contains various representations of position with respect to a planet.

Definition at line 91 of file planet\_fixed\_posn.hh.

### 8.4.2 Constructor & Destructor Documentation

#### 8.4.2.1 `jeod::PlanetFixedPosition::PlanetFixedPosition ( void )`

Construct a [PlanetFixedPosition](#) object.

Definition at line 57 of file planet\_fixed\_posn.cc.

References `cart_coords`, and `planet`.

#### 8.4.2.2 `virtual jeod::PlanetFixedPosition::~~PlanetFixedPosition ( ) [inline],[virtual]`

Destructor.

Definition at line 147 of file planet\_fixed\_posn.hh.

### 8.4.3 Member Function Documentation

#### 8.4.3.1 `void jeod::PlanetFixedPosition::cart_to_ellip ( void ) [protected]`

Convert from cartesian to elliptical position.

Definition at line 172 of file planet\_fixed\_posn.cc.

References `jeod::AltLatLongState::altitude`, `cart_coords`, `jeod::PlanetFixedMessages::domain_error`, `ellip_coords`, `get_elliptic_parameters()`, `jeod::AltLatLongState::latitude`, `jeod::AltLatLongState::longitude`, and `Small_radius_limit`.

Referenced by `update_from_cart()`, and `update_from_spher()`.

#### 8.4.3.2 `void jeod::PlanetFixedPosition::cart_to_spher ( void ) [protected]`

Convert from cartesian to spherical position.

Definition at line 131 of file planet\_fixed\_posn.cc.

References `jeod::AltLatLongState::altitude`, `cart_coords`, `jeod::PlanetFixedMessages::domain_error`, `jeod::AltLatLongState::latitude`, `jeod::AltLatLongState::longitude`, `planet`, `Small_radius_limit`, and `sphere_coords`.

Referenced by `update_from_cart()`, and `update_from_ellip()`.

#### 8.4.3.3 `void jeod::PlanetFixedPosition::ellip_to_cart ( void ) [protected]`

Convert from elliptical to cartesian position.

Definition at line 250 of file planet\_fixed\_posn.cc.

References `jeod::AltLatLongState::altitude`, `cart_coords`, `ellip_coords`, `jeod::AltLatLongState::latitude`, `jeod::AltLatLongState::longitude`, and `planet`.

Referenced by `update_from_ellip()`.

**8.4.3.4** `int jeod::PlanetFixedPosition::get_elliptic_parameters ( double r, double z, double & f, double & h, int maxIters = 10 )` `[protected]`

Definition at line 286 of file `planet_fixed_posn.cc`.

References `planet`.

Referenced by `cart_to_ellip()`.

**8.4.3.5** `void jeod::PlanetFixedPosition::initialize ( Planet * planet_in )` `[virtual]`

Initialize a [PlanetFixedPosition](#) object.

Parameters

<code>in</code>	<code><i>planet_in</i></code>	Associated planet
-----------------	-------------------------------	-------------------

Definition at line 69 of file `planet_fixed_posn.cc`.

References `planet`.

**8.4.3.6** `void jeod::PlanetFixedPosition::spher_to_cart ( void )` `[protected]`

Convert from spherical to cartesian position.

Definition at line 225 of file `planet_fixed_posn.cc`.

References `jeod::AltLatLongState::altitude`, `cart_coords`, `jeod::AltLatLongState::latitude`, `jeod::AltLatLongState::longitude`, `planet`, and `sphere_coords`.

Referenced by `update_from_spher()`.

**8.4.3.7** `void jeod::PlanetFixedPosition::update_from_cart ( const double cart[3] )` `[virtual]`

Update from Cartesian position input.

Parameters

<code>in</code>	<code><i>cart</i></code>	Cartesian coords, PCPF Units: M
-----------------	--------------------------	------------------------------------

Reimplemented in [jeod::NorthEastDown](#).

Definition at line 82 of file `planet_fixed_posn.cc`.

References `cart_coords`, `cart_to_ellip()`, and `cart_to_spher()`.

Referenced by `jeod::NorthEastDown::set_ned_trans_states()`, and `jeod::NorthEastDown::update_from_cart()`.

**8.4.3.8** `void jeod::PlanetFixedPosition::update_from_ellip ( const AltLatLongState & ellip )` `[virtual]`

Update from Elliptical position input.

Parameters

<code>in</code>	<code><i>ellip</i></code>	Elliptical AltLatLong position
-----------------	---------------------------	--------------------------------

Reimplemented in [jeod::NorthEastDown](#).

Definition at line 115 of file `planet_fixed_posn.cc`.

References `jeod::AltLatLongState::altitude`, `cart_to_spher()`, `ellip_coords`, `ellip_to_cart()`, `jeod::AltLatLongState::latitude`, `jeod::AltLatLongState::longitude`, and `jeod::AltLatLongState::set_data()`.

Referenced by `jeod::NorthEastDown::update_from_ellip()`.

#### 8.4.3.9 `void jeod::PlanetFixedPosition::update_from_spher ( const AltLatLongState & spher ) [virtual]`

Update from Spherical position input.

Parameters

<code>in</code>	<code><i>spher</i></code>	Spherical AltLatLong position
-----------------	---------------------------	-------------------------------

Reimplemented in `jeod::NorthEastDown`.

Definition at line 98 of file `planet_fixed_posn.cc`.

References `jeod::AltLatLongState::altitude`, `cart_to_ellip()`, `jeod::AltLatLongState::latitude`, `jeod::AltLatLongState::longitude`, `jeod::AltLatLongState::set_data()`, `spher_to_cart()`, and `sphere_coords`.

Referenced by `jeod::NorthEastDown::update_from_spher()`.

### 8.4.4 Friends And Related Function Documentation

#### 8.4.4.1 `void init_attrjeod__PlanetFixedPosition ( ) [friend]`

#### 8.4.4.2 `friend class InputProcessor [friend]`

Definition at line 93 of file `planet_fixed_posn.hh`.

### 8.4.5 Field Documentation

#### 8.4.5.1 `double jeod::PlanetFixedPosition::cart_coords[3]`

The planet-centered, planet-fixed position of the object.

`trick_units(m)`

Definition at line 130 of file `planet_fixed_posn.hh`.

Referenced by `cart_to_ellip()`, `cart_to_spher()`, `ellip_to_cart()`, `PlanetFixedPosition()`, `spher_to_cart()`, `jeod::NorthEastDown::update_from_cart()`, `update_from_cart()`, `jeod::NorthEastDown::update_from_ellip()`, and `jeod::NorthEastDown::update_from_spher()`.

#### 8.4.5.2 `AltLatLongState jeod::PlanetFixedPosition::ellip_coords`

An object's current position in elliptical coordinates.

Per Vallado p. 140, elliptical latitude is the angle between the equatorial plane and the surface normal on the ellipsoid at the point of interest. Similarly, elliptical longitude is assumed to be the angle between the reference meridian and the surface normal on the ellipsoid at the point of interest.`trick_units(-)`

Definition at line 116 of file `planet_fixed_posn.hh`.

Referenced by `jeod::NorthEastDown::build_ned_orientation()`, `cart_to_ellip()`, `ellip_to_cart()`, and `update_from_ellip()`.

#### 8.4.5.3 `Planet* jeod::PlanetFixedPosition::planet`

The planet currently associated with this.

trick\_units(-)

Definition at line 135 of file planet\_fixed\_posn.hh.

Referenced by `cart_to_spher()`, `ellip_to_cart()`, `get_elliptic_parameters()`, `initialize()`, `PlanetFixedPosition()`, and `spher_to_cart()`.

**8.4.5.4** `const double jeod::PlanetFixedPosition::Small_radius_limit = 1e-60` `[static]`

Limit of ratio of radial distance to planet equatorial radius below which planetary coordinates are deemed to be invalid.

trick\_io(\*o) trick\_units(-)

Definition at line 102 of file planet\_fixed\_posn.hh.

Referenced by `cart_to_ellip()`, and `cart_to_spher()`.

**8.4.5.5** **AltLatLongState** `jeod::PlanetFixedPosition::sphere_coords`

The same object's current position in spherical coordinates.

Per Vallado p. 140, spherical latitude is the angle measured at the planet's center from the equatorial plane to the point of interest. Similarly, spherical longitude is also assumed to be the angle measured at the planet's center from the reference meridian to the point of interest.

trick\_units(-)

Definition at line 125 of file planet\_fixed\_posn.hh.

Referenced by `jeod::NorthEastDown::build_ned_orientation()`, `cart_to_spher()`, `spher_to_cart()`, and `update_from_spher()`.

The documentation for this class was generated from the following files:

- [planet\\_fixed\\_posn.hh](#)
- [planet\\_fixed\\_posn.cc](#)



## Chapter 9

# File Documentation

### 9.1 alt\_lat\_long\_state.cc File Reference

AltLatLongState class methods.

```
#include "../include/alt_lat_long_state.hh"
```

#### Namespaces

- [jeod](#)

*Namespace jeod.*

#### 9.1.1 Detailed Description

AltLatLongState class methods.

Definition in file [alt\\_lat\\_long\\_state.cc](#).

### 9.2 alt\_lat\_long\_state.hh File Reference

Basic orthogonal Altitude-Latitude-Longitude state definition.

```
#include "utils/sim_interface/include/jeod_class.hh"
```

#### Data Structures

- class [jeod::AltLatLongState](#)

*Specifies positional state in planetary altitude, latitude, and longitude.*

#### Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.2.1 Detailed Description

Basic orthogonal Altitude-Latitude-Longitude state definition.

Definition in file [alt\\_lat\\_long\\_state.hh](#).

## 9.3 class\_declarations.hh File Reference

Forward declarations of classes defined in planet-fixed position model header files.

### Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.3.1 Detailed Description

Forward declarations of classes defined in planet-fixed position model header files.

Definition in file [class\\_declarations.hh](#).

## 9.4 north\_east\_down.cc File Reference

NorthEastDown class methods.

```
#include <cstdio>
#include <cmath>
#include "utils/math/include/vector3.hh"
#include "utils/message/include/message_handler.hh"
#include "utils/planet_fixed/planet_fixed_posn/include/planet_fixed_messages.-
hh"
#include "../include/north_east_down.hh"
```

### Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.4.1 Detailed Description

NorthEastDown class methods.

Definition in file [north\\_east\\_down.cc](#).

## 9.5 north\_east\_down.hh File Reference

Implementation of the North-East-Down reference frame.



```
#include "utils/ref_frames/include/ref_frame.hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include "utils/planet_fixed/planet_fixed_posn/include/planet_fixed_posn.-
hh"
#include "utils/planet_fixed/planet_fixed_posn/include/class_declarations.-
hh"
```

## Data Structures

- class [jeod::NorthEastDown](#)  
*Defines a local North-East-Down reference frame.*

## Namespaces

- [jeod](#)  
*Namespace jeod.*

### 9.5.1 Detailed Description

Implementation of the North-East-Down reference frame.

Definition in file [north\\_east\\_down.hh](#).

## 9.6 planet\_fixed\_messages.cc File Reference

Implement the class PlanetFixedMessages.

```
#include "../include/planet_fixed_messages.hh"
```

## Namespaces

- [jeod](#)  
*Namespace jeod.*

## Macros

- #define [PATH](#) "environment/planet\_fixed/"

### 9.6.1 Detailed Description

Implement the class PlanetFixedMessages.

Definition in file [planet\\_fixed\\_messages.cc](#).

## 9.7 planet\_fixed\_messages.hh File Reference

Define the class PlanetFixedMessages, the class that specifies the message IDs used in the planet-fixed model.

```
#include "utils/sim_interface/include/jeod_class.hh"
```

## Data Structures

- class [jeod::PlanetFixedMessages](#)

*Specifies the message IDs used in the gravity model.*

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.7.1 Detailed Description

Define the class PlanetFixedMessages, the class that specifies the message IDs used in the planet-fixed model.

Definition in file [planet\\_fixed\\_messages.hh](#).

## 9.8 planet\_fixed\_posn.cc File Reference

Define PlanetFixedPosition class methods.

```
#include <cstdlib>
#include <cmath>
#include "environment/planet/include/planet.hh"
#include "utils/math/include/vector3.hh"
#include "utils/message/include/message_handler.hh"
#include "../include/planet_fixed_messages.hh"
#include "../include/planet_fixed_posn.hh"
```

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.8.1 Detailed Description

Define PlanetFixedPosition class methods.

Definition in file [planet\\_fixed\\_posn.cc](#).

## 9.9 planet\_fixed\_posn.hh File Reference

Planet centered fixed position model: alternate coordinate system definitions and transformations to those coordinate systems.

```
#include "environment/planet/include/class_declarations.hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include "alt_lat_long_state.hh"
#include "environment/planet/include/planet.hh"
```

## Data Structures

- class [jeod::PlanetFixedPosition](#)

*Contains various representations of position with respect to a planet.*

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.9.1 Detailed Description

Planet centered fixed position model: alternate coordinate system definitions and transformations to those coordinate systems.

Definition in file [planet\\_fixed\\_posn.hh](#).

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