

PlanetFixedModel

5.1

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Chapter 1

Module Index

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Namespace Index

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Module Documentation

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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 PATH

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

Definition at line 37 of file planet_fixed_messages.cc.

Chapter 7

Namespace Documentation

7.1 jeod Namespace Reference

Namespace jeod.

Data Structures

- class [AltLatLongState](#)
Specifies positional state in planetary altitude, latitude, and longitude.
- class [NorthEastDown](#)
Defines a local North-East-Down reference frame.
- 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](#) ()=default
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 AltLatLongState()

```
jeod::AltLatLongState::AltLatLongState ( )
```

Construct an [AltLatLongState](#) object.

Definition at line 38 of file `alt_lat_long_state.cc`.

References altitude, latitude, and longitude.

8.1.2.2 ~AltLatLongState()

```
virtual jeod::AltLatLongState::~~AltLatLongState ( ) [virtual], [default]
```

Destructor.

8.1.3 Member Function Documentation

8.1.3.1 get_data()

```
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 65 of file alt_lat_long_state.cc.

References altitude, latitude, and longitude.

8.1.3.2 set_data()

```
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 51 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 init_attrjeod__AltLatLongState

```
void init_attrjeod__AltLatLongState ( ) [friend]
```

8.1.4.2 InputProcessor

```
friend class InputProcessor [friend]
```

Definition at line 79 of file alt_lat_long_state.hh.

8.1.5 Field Documentation

8.1.5.1 altitude

```
double jeod::AltLatLongState::altitude
```

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

trick_units(m)

Definition at line 84 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 latitude

```
double jeod::AltLatLongState::latitude
```

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

trick_units(rad)

Definition at line 90 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 longitude

```
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 96 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:

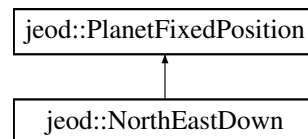
- [alt_lat_long_state.hh](#)
- [alt_lat_long_state.cc](#)

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](#) ()=default
- [~NorthEastDown](#) () override=default
- [NorthEastDown](#) (const [NorthEastDown](#) &)=delete
- [NorthEastDown](#) & [operator=](#) (const [NorthEastDown](#) &)=delete
- void [update_from_cart](#) (const double 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](#) {[undefined](#)}
Is reference point specified in spherical or elliptical coords?

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 AltLatLongType

```
enum jeod::NorthEastDown::AltLatLongType
```

Specifies whether the latitude is spherical or elliptical.

Enumerator

undefined	
spherical	
elliptical	

Definition at line 95 of file north_east_down.hh.

8.2.3 Constructor & Destructor Documentation

8.2.3.1 NorthEastDown() [1/2]

```
jeod::NorthEastDown::NorthEastDown ( ) [default]
```

8.2.3.2 ~NorthEastDown()

```
jeod::NorthEastDown::~~NorthEastDown ( ) [override], [default]
```

8.2.3.3 NorthEastDown() [2/2]

```
jeod::NorthEastDown::NorthEastDown (
    const NorthEastDown & ) [delete]
```

8.2.4 Member Function Documentation

8.2.4.1 build_ned_orientation()

```
void jeod::NorthEastDown::build_ned_orientation ( ) [virtual]
```

Build NED frame state based on current reference point information.

Definition at line 83 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 operator=()

```
NorthEastDown& jeod::NorthEastDown::operator= (
    const NorthEastDown & ) [delete]
```

8.2.4.3 set_ned_trans_states()

```
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 136 of file north_east_down.cc.

References ned_frame, and jeod::PlanetFixedPosition::update_from_cart().

8.2.4.4 update_from_cart()

```
void jeod::NorthEastDown::update_from_cart (
    const double 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 51 of file north_east_down.cc.

References [jeod::PlanetFixedPosition::cart_coords](#), [ned_frame](#), and [jeod::PlanetFixedPosition::update_from_cart\(\)](#).

8.2.4.5 update_from_ellip()

```
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 73 of file north_east_down.cc.

References [jeod::PlanetFixedPosition::cart_coords](#), [ned_frame](#), and [jeod::PlanetFixedPosition::update_from_ellip\(\)](#).

8.2.4.6 update_from_spher()

```
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 62 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 init_attrjeod__NorthEastDown

```
void init_attrjeod__NorthEastDown ( ) [friend]
```

8.2.5.2 InputProcessor

```
friend class InputProcessor [friend]
```

Definition at line 83 of file north_east_down.hh.

8.2.6 Field Documentation

8.2.6.1 altlatlong_type

```
AltLatLongType jeod::NorthEastDown::altlatlong_type {undefined}
```

Is reference point specified in spherical or elliptical coords?

trick_units(-)

Definition at line 112 of file north_east_down.hh.

Referenced by build_ned_orientation().

8.2.6.2 ned_frame

```
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 90 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>
```

Public Member Functions

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

Static Public Attributes

- static const char * [invalid_request](#) = "environment/planet_fixed/" "invalid_request"
Issued when a selection such as an enum value is invalid.
- static const char * [domain_error](#) = "environment/planet_fixed/" "domain_error"
Issued when a value is invalid such as an overly small radius.

Friends

- class [InputProcessor](#)
- void [init_attrjeod__PlanetFixedMessages](#) ()

8.3.1 Detailed Description

Specifies the message IDs used in the gravity model.

Definition at line 83 of file planet_fixed_messages.hh.

8.3.2 Constructor & Destructor Documentation

8.3.2.1 PlanetFixedMessages() [1/2]

```
jeod::PlanetFixedMessages::PlanetFixedMessages ( ) [delete]
```

8.3.2.2 PlanetFixedMessages() [2/2]

```
jeod::PlanetFixedMessages::PlanetFixedMessages (
    const PlanetFixedMessages & ) [delete]
```

8.3.3 Member Function Documentation

8.3.3.1 operator=()

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

8.3.4 Friends And Related Function Documentation

8.3.4.1 init_attrjeod__PlanetFixedMessages

```
void init_attrjeod__PlanetFixedMessages ( ) [friend]
```

8.3.4.2 InputProcessor

```
friend class InputProcessor [friend]
```

Definition at line 85 of file planet_fixed_messages.hh.

8.3.5 Field Documentation

8.3.5.1 domain_error

```
const char * 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 95 of file planet_fixed_messages.hh.

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

8.3.5.2 invalid_request

```
const char * 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 90 of file planet_fixed_messages.hh.

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

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

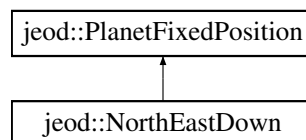
- [planet_fixed_messages.hh](#)
- [planet_fixed_messages.cc](#)

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](#) ()=default
- virtual [~PlanetFixedPosition](#) ()=default
- 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 constexpr 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.
- static constexpr int [Max_iteration_limit](#) {10}
Limit of number of iterations used to solve elliptic parameters.

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=[Max_iteration_limit](#))

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 PlanetFixedPosition()

```
jeod::PlanetFixedPosition::PlanetFixedPosition ( ) [default]
```

8.4.2.2 ~PlanetFixedPosition()

```
virtual jeod::PlanetFixedPosition::~~PlanetFixedPosition ( ) [virtual], [default]
```

8.4.3 Member Function Documentation

8.4.3.1 cart_to_ellip()

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

Convert from cartesian to elliptical position.

Definition at line 136 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 cart_to_spher()

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

Convert from cartesian to spherical position.

Definition at line 94 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 `ellip_to_cart()`

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

Convert from elliptical to cartesian position.

Definition at line 208 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 `get_elliptic_parameters()`

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

Definition at line 238 of file `planet_fixed_posn.cc`.

References `planet`.

Referenced by `cart_to_ellip()`.

8.4.3.5 `initialize()`

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

Initialize a `PlanetFixedPosition` object.

Parameters

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

Definition at line 50 of file `planet_fixed_posn.cc`.

References `planet`.

8.4.3.6 `spher_to_cart()`

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

Convert from spherical to cartesian position.

Definition at line 188 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 `update_from_cart()`

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

Update from Cartesian position input.

Parameters

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

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

Definition at line 59 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 `update_from_ellip()`

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

Update from Elliptical position input.

Parameters

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

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

Definition at line 83 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 update_from_spher()

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

Update from Spherical position input.

Parameters

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

Reimplemented in `jeod::NorthEastDown`.

Definition at line 71 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 init_attrjeod__PlanetFixedPosition

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

8.4.4.2 InputProcessor

```
friend class InputProcessor [friend]
```

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

8.4.5 Field Documentation

8.4.5.1 cart_coords

```
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()`, `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 ellip_coords

```
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 Max_iteration_limit

```
constexpr int jeod::PlanetFixedPosition::Max_iteration_limit {10} [static]
```

Limit of number of iterations used to solve elliptic parameters.

trick_io(*o) `trick_units(-)`

Definition at line 104 of file planet_fixed_posn.hh.

8.4.5.4 planet

```
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()`, and `spher_to_cart()`.

8.4.5.5 Small_radius_limit

```
constexpr 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 99 of file planet_fixed_posn.hh.

Referenced by cart_to_ellip(), and cart_to_spher().

8.4.5.6 sphere_coords

```
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.

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.

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.

9.4 north_east_down.cc File Reference

NorthEastDown class methods.

```
#include <cmath>
#include <cstdio>
#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.

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/class_declarations.↵
hh"
#include "utils/planet_fixed/planet_fixed_posn/include/planet_fixed_posn.↵
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.

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.

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.

9.8 planet_fixed_posn.cc File Reference

Define PlanetFixedPosition class methods.

```
#include <cmath>
#include <cstdint>
#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.

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.

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