DerivedStateModel

5.0

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- file euler_derived_state.hh

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- file planetary_derived_state.hh

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- file relative_derived_state.hh

  Define the class RelativeDerivedState, the class used for deriving the state of some frame associated with the subject DynBody relative to some other target frame.
- file solar_beta_derived_state.hh

  A class for calculating the solar beta of a vehicle.
- file derived_state.cc

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- file derived_state_messages.cc

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- file euler_derived_state.cc

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- file lvlh_derived_state.cc

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- file lvlh_relative_derived_state.cc

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- file ned_derived_state.cc

  Define methods for NedDerivedState.
- file orb_elem_derived_state.cc

  Define methods for the orbital elements derived state class.
- file planetary_derived_state.cc

  Define methods for the base body initialization class.
- file relative_derived_state.cc

  Define methods for the base body initialization class.
- file solar_beta_derived_state.cc

  This function calculates the angle between a spacecraft's orbital plane and the vector from the relevant planet to the sun.

Namespaces

- jeod

    Namespace jeod.

Macros

- #define PATH "dynamics/derived_state/"
- #define EPSILON 0.0000001

6.3.1 Detailed Description

6.3.2 Macro Definition Documentation

6.3.2.1 EPSILON

```
#define EPSILON 0.0000001
```

Definition at line 34 of file solar_beta_derived_state.cc.

Referenced by jeod::SolarBetaDerivedState::update().

6.3.2.2 PATH

```
#define PATH "dynamics/derived_state/"
```

Definition at line 31 of file derived_state_messages.cc.

Chapter 7

Namespace Documentation

7.1 jeod Namespace Reference

Namespace jeod.

Data Structures

- class DerivedState

    The base class used for deriving a state representation of some subject DynBody.
- class DerivedStateMessages

    The class that specifies the message IDs used in the DerivedState model.
- class EulerDerivedState

    The class used for deriving the Euler angle representation of a subject DynBody's attitude.
- class LvlhDerivedState

    The class used for deriving the rectilinear LVLH representations of a subject DynBody's state.
- class LvlhRelativeDerivedState

    The class used for calculating the LVLH state of a subject DynBody relative to some LVLH reference frame.
- class NedDerivedState

    The class used for deriving the North-East-Down representations of a subject DynBody's state.
- class OrbElemDerivedState

    The class used for deriving the orbital elements representation of a subject DynBody's position.
- class PlanetaryDerivedState

    The class used for deriving the planet-fixed representations of a subject DynBody's position.
- class RelativeDerivedState

    The class used for deriving the state of some frame associated with the subject DynBody relative to some other target frame.
- class SolarBetaDerivedState

    The class for calculating the solar beta of a vehicle.

7.1.1 Detailed Description

Namespace jeod.

Chapter 8

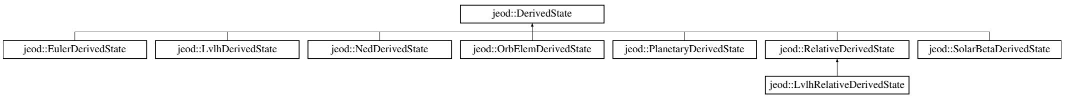
Data Structure Documentation

8.1 jeod::DerivedState Class Reference

The base class used for deriving a state representation of some subject DynBody.

```
#include <derived_state.hh>
```

Inheritance diagram for jeod::DerivedState:


jeod::DerivedState
jeod::EulerDerivedState
jeod::LvlhDerivedState
jeod::NedDerivedState
jeod::OrbElemDerivedState
jeod::PlanetaryDerivedState
jeod::RelativeDerivedState
jeod::SolarBetaDerivedState
jeod::LvlhRelativeDerivedState

Public Member Functions

- DerivedState ()

  Construct a DerivedState.
- virtual ∼DerivedState ()

  Destruct a DerivedState.
- void set_reference_name (const char ∗new_name)

  Set the reference_name to a copy of the supplied value.
- virtual void initialize (DynBody &subject_body, DynManager &dyn_manager)

  Begin initialization of a DerivedState.
- virtual void update (void)

  Update the state.

Data Fields

- DynBody ∗ subject

  The body that is the subject of the derived state.
- char ∗ reference_name

  The name of the object with respect to which the subject state is assessed.

Protected Member Functions

- Planet ∗ find_planet (DynManager &dyn_manager, const char ∗planet_name, const char ∗variable_name)

  Find the Planet with the given name, failing if not found.

Protected Attributes

- char ∗ state_identifier

  An identifier for this derived state, constructed at initialization time from the class name, the subject body name, and the reference name.

Private Member Functions

- DerivedState (const DerivedState &)
- DerivedState & operator= (const DerivedState &)

Friends

- class InputProcessor
- void init_attrjeod__DerivedState ()

8.1.1 Detailed Description

The base class used for deriving a state representation of some subject DynBody.

Definition at line 85 of file derived_state.hh.

8.1.2 Constructor & Destructor Documentation

8.1.2.1 DerivedState() [1/2]

```
jeod::DerivedState::DerivedState (
             const DerivedState &   )   [private]
```

8.1.2.2 DerivedState() [2/2]

```
jeod::DerivedState::DerivedState (
             void   )
```

Construct a DerivedState.

Definition at line 56 of file derived_state.cc.

8.1.2.3 ∼DerivedState()

```
jeod::DerivedState::∼DerivedState (
             void  )  [virtual]
```

Destruct a DerivedState.

Definition at line 70 of file derived_state.cc.

References reference_name, and state_identifier.

8.1.3 Member Function Documentation

8.1.3.1 find_planet()

```
Planet * jeod::DerivedState::find_planet (
             DynManager & dyn_manager,
             const char * planet_name,
             const char * variable_name )  [protected]
```

Find the Planet with the given name, failing if not found.

Returns

Found Planet

Parameters

in	*dyn_manager*	Dynamics manager
in	*planet_name*	Planet name
in	*variable_name*	For error reporting

Definition at line 171 of file derived_state.cc.

References jeod::DerivedStateMessages::invalid_name, and state_identifier.

Referenced by jeod::PlanetaryDerivedState::initialize(), jeod::OrbElemDerivedState::initialize(), jeod::NedDerivedState::initialize(), and jeod::SolarBetaDerivedState::initialize().

8.1.3.2 initialize()

```
void jeod::DerivedState::initialize (
             DynBody & subject_body,
             DynManager & dyn_manager )  [virtual]
```

Begin initialization of a DerivedState.

The initialize method for all subclasses of DerivedState *nust* pass the initialize call to their immediate parent class, which in turn must do the same, eventually invoking this method.

Assumptions and Limitations

- g++ is being used as the compiler

Parameters

in,out	*subject_body*	Subject body
in,out	*dyn_manager*	Dynamics manager

Reimplemented in jeod::RelativeDerivedState, jeod::SolarBetaDerivedState, jeod::EulerDerivedState, jeod::LvlhDerivedState, jeod::NedDerivedState, jeod::OrbElemDerivedState, jeod::LvlhRelativeDerivedState, and jeod::PlanetaryDerivedState.

Definition at line 121 of file derived_state.cc.

References reference_name, state_identifier, and subject.

Referenced by jeod::PlanetaryDerivedState::initialize(), jeod::OrbElemDerivedState::initialize(), jeod::NedDerivedState::initialize(), jeod::LvlhDerivedState::initialize(), jeod::EulerDerivedState::initialize(), jeod::SolarBetaDerivedState::initialize(), and jeod::RelativeDerivedState::initialize().

8.1.3.3 operator=()

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

8.1.3.4 set_reference_name()

```
void jeod::DerivedState::set_reference_name (
              const char * new_name )
```

Set the reference_name to a copy of the supplied value.

Parameters

in	*new_name*	new name of reference.

Definition at line 90 of file derived_state.cc.

References reference_name.

8.1.3.5 update()

```
void jeod::DerivedState::update (
              void )  [virtual]
```

Update the state.

Reimplemented in jeod::RelativeDerivedState, jeod::SolarBetaDerivedState, jeod::EulerDerivedState, jeod::LvlhDerivedState, jeod::NedDerivedState, jeod::OrbElemDerivedState, jeod::PlanetaryDerivedState, and jeod::LvlhRelativeDerivedState.

Definition at line 148 of file derived_state.cc.

Referenced by jeod::OrbElemDerivedState::update(), and jeod::EulerDerivedState::update().

8.1.4 Friends And Related Function Documentation

8.1.4.1 init_attrjeod__DerivedState

```
void init_attrjeod__DerivedState ( )  [friend]
```

8.1.4.2 InputProcessor

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

Definition at line 87 of file derived_state.hh.

8.1.5 Field Documentation

8.1.5.1 reference_name

```
char* jeod::DerivedState::reference_name
```

The name of the object with respect to which the subject state is assessed.

trick_units(–)

Definition at line 103 of file derived_state.hh.

Referenced by jeod::PlanetaryDerivedState::initialize(), jeod::OrbElemDerivedState::initialize(), jeod::NedDerived↩ State::initialize(), jeod::LvlhDerivedState::initialize(), initialize(), jeod::SolarBetaDerivedState::initialize(), set_↩ reference_name(), and ∼DerivedState().

8.1.5.2 state_identifier

```
char* jeod::DerivedState::state_identifier [protected]
```

An identifier for this derived state, constructed at initialization time from the class name, the subject body name, and the reference name.

This is used for generating error and debug messages.trick_units(–)

Definition at line 113 of file derived_state.hh.

Referenced by find_planet(), initialize(), jeod::RelativeDerivedState::initialize(), and ∼DerivedState().

8.1.5.3 subject

```
DynBody* jeod::DerivedState::subject
```

The body that is the subject of the derived state.

trick_units(–)

Definition at line 97 of file derived_state.hh.

Referenced by jeod::LvlhDerivedState::initialize(), initialize(), jeod::RelativeDerivedState::initialize(), jeod::↩ PlanetaryDerivedState::update(), jeod::OrbElemDerivedState::update(), jeod::NedDerivedState::update(), jeod::↩ EulerDerivedState::update(), and jeod::SolarBetaDerivedState::update().

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

- derived_state.hh
- derived_state.cc

8.2 jeod::DerivedStateMessages Class Reference

The class that specifies the message IDs used in the DerivedState model.

```
#include <derived_state_messages.hh>
```

Static Public Attributes

- static char const ∗ fatal_error

  Issued when performing an action results in an error return from the method performing the action.
- static char const ∗ illegal_value

  Issued when a simple type (e.g.
- static char const ∗ invalid_name

  Issued when a name is invalid (NULL, empty, or does not name an object of the specified type).
- static char const ∗ invalid_object

  Issued when a pointer points to an object of the wrong type.
- static char const ∗ null_pointer

  Error issued when a pointer is required but was not provided.
- static char const ∗ trace

  Debug message issued to trace DerivedState actions.
- static char const ∗ divide_by_zero

  Fatal message when a divide by zero is encountered.

Private Member Functions

- DerivedStateMessages (void)
- DerivedStateMessages (const DerivedStateMessages &)
- DerivedStateMessages & operator= (const DerivedStateMessages &)

Friends

- class InputProcessor
- void init_attrjeod__DerivedStateMessages ()

8.2.1 Detailed Description

The class that specifies the message IDs used in the DerivedState model.

Definition at line 82 of file derived_state_messages.hh.

8.2.2 Constructor & Destructor Documentation

8.2.2.1 DerivedStateMessages() [1/2]

```
jeod::DerivedStateMessages::DerivedStateMessages (
             void   )   [private]
```

8.2.2.2 DerivedStateMessages() [2/2]

```
jeod::DerivedStateMessages::DerivedStateMessages (
             const DerivedStateMessages &   )   [private]
```

8.2.3 Member Function Documentation

8.2.3.1 operator=()

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

8.2.4 Friends And Related Function Documentation

8.2.4.1 init_attrjeod__DerivedStateMessages

```
void init_attrjeod__DerivedStateMessages ( )  [friend]
```

8.2.4.2 InputProcessor

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

Definition at line 85 of file derived_state_messages.hh.

8.2.5 Field Documentation

8.2.5.1 divide_by_zero

```
char const * jeod::DerivedStateMessages::divide_by_zero  [static]
```

Initial value:

```
=
   "dynamics/derived_state/"  "divide_by_zero"
```

Fatal message when a divide by zero is encountered.

trick_units(--)

Definition at line 126 of file derived_state_messages.hh.

Referenced by jeod::SolarBetaDerivedState::update().

8.2.5.2 fatal_error

```
char const * jeod::DerivedStateMessages::fatal_error  [static]
```

Initial value:

```
=
    "dynamics/derived_state/"  "fatal_error"
```

Issued when performing an action results in an error return from the method performing the action.

trick_units(--)

Definition at line 95 of file derived_state_messages.hh.

8.2.5.3 illegal_value

```
char const * jeod::DerivedStateMessages::illegal_value [static]
```

Initial value:

```
=
    "dynamics/derived_state/" "illegal_value"
```

Issued when a simple type (e.g.

an enum) has an illegal value.trick_units(–)

Definition at line 100 of file derived_state_messages.hh.

Referenced by jeod::LvlhRelativeDerivedState::convert_circ_to_rect(), jeod::LvlhRelativeDerivedState::convert_↩rect_to_circ(), jeod::LvlhRelativeDerivedState::update(), and jeod::RelativeDerivedState::update().

8.2.5.4 invalid_name

```
char const * jeod::DerivedStateMessages::invalid_name [static]
```

Initial value:

```
=
    "dynamics/derived_state/" "invalid_name"
```

Issued when a name is invalid (NULL, empty, or does not name an object of the specified type).

trick_units(–)

Definition at line 106 of file derived_state_messages.hh.

Referenced by jeod::DerivedState::find_planet(), and jeod::RelativeDerivedState::initialize().

8.2.5.5 invalid_object

```
char const * jeod::DerivedStateMessages::invalid_object [static]
```

Initial value:

```
=
    "dynamics/derived_state/" "invalid_object"
```

Issued when a pointer points to an object of the wrong type.

trick_units(–)

Definition at line 111 of file derived_state_messages.hh.

8.2.5.6 null_pointer

```
char const * jeod::DerivedStateMessages::null_pointer [static]
```

Initial value:

```
=
     "dynamics/derived_state/"  "null_pointer"
```

Error issued when a pointer is required but was not provided.

trick_units(–)

Definition at line 116 of file derived_state_messages.hh.

8.2.5.7 trace

```
char const * jeod::DerivedStateMessages::trace [static]
```

Initial value:

```
=
     "dynamics/derived_state/"  "trace"
```

Debug message issued to trace DerivedState actions.

trick_units(–)

Definition at line 121 of file derived_state_messages.hh.

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

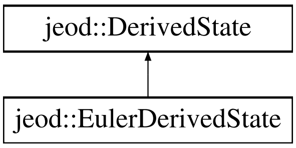
- derived_state_messages.hh
- derived_state_messages.cc

8.3 jeod::EulerDerivedState Class Reference

The class used for deriving the Euler angle representation of a subject DynBody's attitude.

```
#include <euler_derived_state.hh>
```

Inheritance diagram for jeod::EulerDerivedState:



Public Member Functions

- EulerDerivedState ()

    Construct a EulerDerivedState object.
- ∼EulerDerivedState ()

    Destruct a EulerDerivedState object.
- virtual void initialize (DynBody &subject_body, DynManager &dyn_manager)

    Begin initialization of a EulerDerivedState.
- virtual void initialize (RefFrame &ref_frame, DynBody &subject_body, DynManager &dyn_manager)

    Begin initialization of a EulerDerivedState.
- virtual void update (void)

    Compute the Euler angles.

Data Fields

- Orientation::EulerSequence sequence

    Euler angle sequence specification.
- double ref_body_angles [3]

    Euler angles from reference frame.
- double body_ref_angles [3]

    Euler angles to reference frame.
- RefFrameState rel_state

    The relative state of the body.

Protected Attributes

- RefFrame ∗ rel_frame

    Reference frame from which to compute the Euler angle attitude.

Private Member Functions

- EulerDerivedState (const EulerDerivedState &)
- EulerDerivedState & operator= (const EulerDerivedState &)

Friends

- class InputProcessor
- void init_attrjeod__EulerDerivedState ()

Additional Inherited Members

8.3.1 Detailed Description

The class used for deriving the Euler angle representation of a subject DynBody's attitude.

Definition at line 89 of file euler_derived_state.hh.

8.3.2 Constructor & Destructor Documentation

8.3.2.1 EulerDerivedState() [1/2]

```
jeod::EulerDerivedState::EulerDerivedState (
             void )
```

Construct a EulerDerivedState object.

Definition at line 48 of file euler_derived_state.cc.

References body_ref_angles, and ref_body_angles.

8.3.2.2 ∼EulerDerivedState()

```
jeod::EulerDerivedState::∼EulerDerivedState (
             void )
```

Destruct a EulerDerivedState object.

Definition at line 67 of file euler_derived_state.cc.

References rel_frame.

8.3.2.3 EulerDerivedState() [2/2]

```
jeod::EulerDerivedState::EulerDerivedState (
             const EulerDerivedState & )  [private]
```

8.3.3 Member Function Documentation

8.3.3.1 initialize() [1/2]

```
void jeod::EulerDerivedState::initialize (
             DynBody & subject_body,
             DynManager & dyn_manager )  [virtual]
```

Begin initialization of a EulerDerivedState.

The initialize method for all subclasses of DerivedState *must* pass the initialize call to their immediate parent class, which in turn must do the same, eventually invoking this method.

Parameters

in,out	*subject_body*	Subject body.
in,out	*dyn_manager*	Dynamics manager.

Reimplemented from jeod::DerivedState.

Definition at line 87 of file euler_derived_state.cc.

References jeod::DerivedState::initialize().

8.3.3.2 initialize() [2/2]

```
void jeod::EulerDerivedState::initialize (
             RefFrame & ref_frame,
             DynBody & subject_body,
             DynManager & dyn_manager )  [virtual]
```

Begin initialization of a EulerDerivedState.

The initialize method for all subclasses of DerivedState *must* pass the initialize call to their immediate parent class, which in turn must do the same, eventually invoking this method.

Parameters

in	*ref_frame*	Reference frame for angles.
in,out	*subject_body*	Subject body.
in,out	*dyn_manager*	Dynamics manager.

Definition at line 107 of file euler_derived_state.cc.

References jeod::DerivedState::initialize(), and rel_frame.

8.3.3.3 operator=()

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

8.3.3.4 update()

```
void jeod::EulerDerivedState::update (
             void  )  [virtual]
```

Compute the Euler angles.

Assumptions and Limitations

- Depends upon the Trick Euler angle math macros and routines.

Reimplemented from jeod::DerivedState.

Definition at line 130 of file euler_derived_state.cc.

References body_ref_angles, ref_body_angles, rel_frame, rel_state, sequence, jeod::DerivedState::subject, and jeod::DerivedState::update().

8.3.4 Friends And Related Function Documentation

8.3.4.1 init_attrjeod__EulerDerivedState

```
void init_attrjeod__EulerDerivedState ( )  [friend]
```

8.3.4.2 InputProcessor

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

Definition at line 91 of file euler_derived_state.hh.

8.3.5 Field Documentation

8.3.5.1 body_ref_angles

```
double jeod::EulerDerivedState::body_ref_angles[3]
```

Euler angles to reference frame.

trick_units(rad)

Definition at line 111 of file euler_derived_state.hh.

Referenced by EulerDerivedState(), and update().

8.3.5.2 ref_body_angles

```
double jeod::EulerDerivedState::ref_body_angles[3]
```

Euler angles from reference frame.

trick_units(rad)

Definition at line 106 of file euler_derived_state.hh.

Referenced by EulerDerivedState(), and update().

8.3.5.3 rel_frame

```
RefFrame* jeod::EulerDerivedState::rel_frame  [protected]
```

Reference frame from which to compute the Euler angle attitude.

If this is NULL then the body's parent frame is used.trick_units(–)

Definition at line 127 of file euler_derived_state.hh.

Referenced by initialize(), update(), and ∼EulerDerivedState().

8.3.5.4 rel_state

```
RefFrameState jeod::EulerDerivedState::rel_state
```

The relative state of the body.

This is just a copy of the body's state when the relative frame is the parent frame. This is a computed relative state when the relative frame is not the parent frame.trick_units(–)

Definition at line 118 of file euler_derived_state.hh.

Referenced by update().

8.3.5.5 sequence

```
Orientation::EulerSequence jeod::EulerDerivedState::sequence
```

Euler angle sequence specification.

trick_units(–)

Definition at line 101 of file euler_derived_state.hh.

Referenced by update().

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

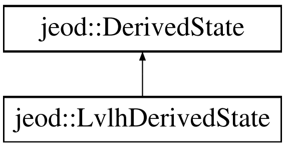
- euler_derived_state.hh
- euler_derived_state.cc

8.4 jeod::LvlhDerivedState Class Reference

The class used for deriving the rectilinear LVLH representations of a subject DynBody's state.

```
#include <lvlh_derived_state.hh>
```

Inheritance diagram for jeod::LvlhDerivedState:



Public Member Functions

- LvlhDerivedState ()

  Construct a LvlhDerivedState object.
- ∼LvlhDerivedState ()

  Destruct a LvlhDerivedState object.
- virtual void initialize (DynBody &subject_body, DynManager &dyn_manager)

  Begin initialization of a LvlhDerivedState.
- virtual void update (void)

  Update the state.

Data Fields

- bool register_frame

  If set (default), the LVLH frame will be registered with the dynamics manager at initialization time.
- RefFrame lvlh_frame

  The LVLH frame of the subject body with respect to the planet specified by the reference name.
- LvlhFrame lvlh_state

  The LvlhFrame object responsible for maintaining the lvlh_frame.

Protected Attributes

- RefFrame ∗ planet_centered_inertial

  The inertial frame with origin at the center of the specified planet.

Private Member Functions

- LvlhDerivedState (const LvlhDerivedState &)
- LvlhDerivedState & operator= (const LvlhDerivedState &)

Private Attributes

- DynManager ∗ local_dm

Friends

- class InputProcessor
- void init_attrjeod__LvlhDerivedState ()

Additional Inherited Members

8.4.1 Detailed Description

The class used for deriving the rectilinear LVLH representations of a subject DynBody's state.

Definition at line 85 of file lvlh_derived_state.hh.

8.4.2 Constructor & Destructor Documentation

8.4.2.1 LvlhDerivedState() [1/2]

```
jeod::LvlhDerivedState::LvlhDerivedState (
            void  )
```

Construct a LvlhDerivedState object.

Definition at line 51 of file lvlh_derived_state.cc.

8.4.2.2 ~LvlhDerivedState()

```
jeod::LvlhDerivedState::~LvlhDerivedState (
            void  )
```

Destruct a LvlhDerivedState object.

Definition at line 69 of file lvlh_derived_state.cc.

References local_dm, and lvlh_frame.

8.4.2.3 LvlhDerivedState() [2/2]

```
jeod::LvlhDerivedState::LvlhDerivedState (
            const LvlhDerivedState &  )  [private]
```

8.4.3 Member Function Documentation

8.4.3.1 initialize()

```
void jeod::LvlhDerivedState::initialize (
            DynBody & subject_body,
            DynManager & dyn_manager )  [virtual]
```

Begin initialization of a LvlhDerivedState.

The initialize method for all subclasses of DerivedState *nust* pass the initialize call to their immediate parent class, which in turn must do the same, eventually invoking this method.

Parameters

in,out	*subject_body*	Subject body
in,out	*dyn_manager*	Dynamics manager

Reimplemented from jeod::DerivedState.

Definition at line 92 of file lvlh_derived_state.cc.

References jeod::DerivedState::initialize(), local_dm, lvlh_frame, lvlh_state, planet_centered_inertial, jeod::DerivedState::reference_name, register_frame, and jeod::DerivedState::subject.

8.4.3.2 operator=()

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

8.4.3.3 update()

```
void jeod::LvlhDerivedState::update (
             void  )  [virtual]
```

Update the state.

Reimplemented from jeod::DerivedState.

Definition at line 119 of file lvlh_derived_state.cc.

References lvlh_frame, and lvlh_state.

8.4.4 Friends And Related Function Documentation

8.4.4.1 init_attrjeod__LvlhDerivedState

```
void init_attrjeod__LvlhDerivedState ( )  [friend]
```

8.4.4.2 InputProcessor

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

Definition at line 87 of file lvlh_derived_state.hh.

8.4.5 Field Documentation

8.4.5.1 local_dm

```
DynManager* jeod::LvlhDerivedState::local_dm  [private]
```

Definition at line 123 of file lvlh_derived_state.hh.

Referenced by initialize(), and ∼LvlhDerivedState().

8.4.5.2 lvlh_frame

```
RefFrame jeod::LvlhDerivedState::lvlh_frame
```

The LVLH frame of the subject body with respect to the planet specified by the reference name.

trick_units(–)

Definition at line 105 of file lvlh_derived_state.hh.

Referenced by initialize(), update(), and ∼LvlhDerivedState().

8.4.5.3 lvlh_state

```
LvlhFrame jeod::LvlhDerivedState::lvlh_state
```

The LvlhFrame object responsible for maintaining the lvlh_frame.

trick_units(–)

Definition at line 110 of file lvlh_derived_state.hh.

Referenced by initialize(), and update().

8.4.5.4 planet_centered_inertial

```
RefFrame* jeod::LvlhDerivedState::planet_centered_inertial  [protected]
```

The inertial frame with origin at the center of the specified planet.

trick_units(–)

Definition at line 118 of file lvlh_derived_state.hh.

Referenced by initialize().

8.4.5.5 register_frame

```
bool jeod::LvlhDerivedState::register_frame
```

If set (default), the LVLH frame will be registered with the dynamics manager at initialization time.

This will make the frame accessible through the dynamic manager via its find_ref_frame method.trick_units(–)

Definition at line 99 of file lvlh_derived_state.hh.

Referenced by initialize().

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

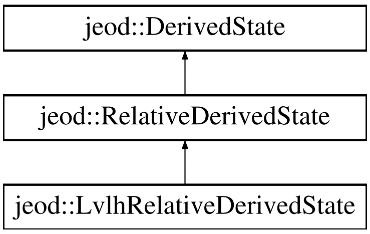
- lvlh_derived_state.hh
- lvlh_derived_state.cc

8.5 jeod::LvlhRelativeDerivedState Class Reference

The class used for calculating the LVLH state of a subject DynBody relative to some LVLH reference frame.

```
#include <lvlh_relative_derived_state.hh>
```

Inheritance diagram for jeod::LvlhRelativeDerivedState:



Public Member Functions

- LvlhRelativeDerivedState (void)

    Default Constructor.
- virtual ~LvlhRelativeDerivedState (void)

    Destructor; defined because it's virtual.
- virtual void initialize (DynBody &subject_body, DynManager &dyn_manager)

    Begin initialization of an LvlhRelativeDerivedState.
- virtual void update (void)

    Update the state.
- void convert_rect_to_circ (const RefFrameState rect_rel_state)

    Convert from rectilinear LVLH coordinates to circular curvilinear.
- void convert_circ_to_rect (const RefFrameState circ_rel_state)

    Convert from circular curvilinear LVLH coordinates to rectilinear.

Data Fields

- LvlhType::Type lvlh_type

  Indicates type of LVLH coordinates desired.
- bool use_theta_dot_correction

  Indicates whether or not to correct for changing phase angle in curvilinear coordinates.

Private Member Functions

- void do_theta_dot_correction (double omega[3], const RefFrameState &state, const double r, bool c2r)

  Compute thetadot correction to omega.
- LvlhRelativeDerivedState (const LvlhRelativeDerivedState &)
- LvlhRelativeDerivedState & operator= (const LvlhRelativeDerivedState &)

Friends

- class InputProcessor
- void init_attrjeod__LvlhRelativeDerivedState ()

Additional Inherited Members

8.5.1 Detailed Description

The class used for calculating the LVLH state of a subject DynBody relative to some LVLH reference frame.

Definition at line 89 of file lvlh_relative_derived_state.hh.

8.5.2 Constructor & Destructor Documentation

8.5.2.1 LvlhRelativeDerivedState() [1/2]

```
jeod::LvlhRelativeDerivedState::LvlhRelativeDerivedState (
            void  )
```

Default Constructor.

Definition at line 54 of file lvlh_relative_derived_state.cc.

References jeod::RelativeDerivedState::ComputeSubjectStateinTarget, and jeod::RelativeDerivedState::direction_sense.

8.5.2.2 ∼LvlhRelativeDerivedState()

```
virtual jeod::LvlhRelativeDerivedState::∼LvlhRelativeDerivedState (
             void  )  [inline], [virtual]
```

Destructor; defined because it's virtual.

Definition at line 119 of file lvlh_relative_derived_state.hh.

8.5.2.3 LvlhRelativeDerivedState() [2/2]

```
jeod::LvlhRelativeDerivedState::LvlhRelativeDerivedState (
             const LvlhRelativeDerivedState &  )  [private]
```

8.5.3 Member Function Documentation

8.5.3.1 convert_circ_to_rect()

```
void jeod::LvlhRelativeDerivedState::convert_circ_to_rect (
             const RefFrameState curvi_rel_state )
```

Convert from circular curvilinear LVLH coordinates to rectilinear.

Parameters

in	*curvi_rel_state*	Source state

Definition at line 220 of file lvlh_relative_derived_state.cc.

References do_theta_dot_correction(), jeod::DerivedStateMessages::illegal_value, jeod::RelativeDerivedState::name, jeod::RelativeDerivedState::rel_state, and jeod::RelativeDerivedState::target_frame.

8.5.3.2 convert_rect_to_circ()

```
void jeod::LvlhRelativeDerivedState::convert_rect_to_circ (
             const RefFrameState rect_rel_state )
```

Convert from rectilinear LVLH coordinates to circular curvilinear.

Parameters

in	*rect_rel_state*	Source state

Definition at line 135 of file lvlh_relative_derived_state.cc.

References do_theta_dot_correction(), jeod::DerivedStateMessages::illegal_value, jeod::RelativeDerivedState↩ ::name, jeod::RelativeDerivedState::rel_state, and jeod::RelativeDerivedState::target_frame.

Referenced by update().

8.5.3.3 do_theta_dot_correction()

```
void jeod::LvlhRelativeDerivedState::do_theta_dot_correction (
            double omega[3],
            const RefFrameState & state,
            const double r,
            bool c2r )  [private]
```

Compute thetadot correction to omega.

Definition at line 301 of file lvlh_relative_derived_state.cc.

References jeod::RelativeDerivedState::target_frame, and use_theta_dot_correction.

Referenced by convert_circ_to_rect(), and convert_rect_to_circ().

8.5.3.4 initialize()

```
void jeod::LvlhRelativeDerivedState::initialize (
            DynBody & subject_body,
            DynManager & dyn_manager )  [virtual]
```

Begin initialization of an LvlhRelativeDerivedState.

The initialize method for all subclasses of DerivedState *must* pass the initialize call to their immediate parent class.

Parameters

in,out	*subject_body*	Subject body
in,out	*dyn_manager*	Dynamics manager

Reimplemented from jeod::RelativeDerivedState.

Definition at line 74 of file lvlh_relative_derived_state.cc.

References jeod::RelativeDerivedState::initialize().

8.5.3.5 operator=()

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

8.5.3.6 update()

```
void jeod::LvlhRelativeDerivedState::update (
             void ) [virtual]
```

Update the state.

Reimplemented from jeod::RelativeDerivedState.

Definition at line 88 of file lvlh_relative_derived_state.cc.

References convert_rect_to_circ(), jeod::DerivedStateMessages::illegal_value, lvlh_type, jeod::RelativeDerivedState::rel_state, jeod::RelativeDerivedState::subject_frame, and jeod::RelativeDerivedState::target_frame.

8.5.4 Friends And Related Function Documentation

8.5.4.1 init_attrjeod__LvlhRelativeDerivedState

```
void init_attrjeod__LvlhRelativeDerivedState ( ) [friend]
```

8.5.4.2 InputProcessor

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

Definition at line 91 of file lvlh_relative_derived_state.hh.

8.5.5 Field Documentation

8.5.5.1 lvlh_type

```
LvlhType::Type jeod::LvlhRelativeDerivedState::lvlh_type
```

Indicates type of LVLH coordinates desired.

Default is rectilinear.trick_units(–)

Definition at line 101 of file lvlh_relative_derived_state.hh.

Referenced by update().

8.5.5.2 use_theta_dot_correction

```
bool jeod::LvlhRelativeDerivedState::use_theta_dot_correction
```

Indicates whether or not to correct for changing phase angle in curvilinear coordinates.

Default is false.trick_units(–)

Definition at line 107 of file lvlh_relative_derived_state.hh.

Referenced by do_theta_dot_correction().

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

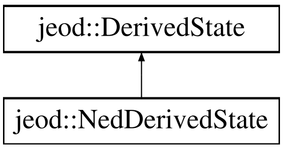
- lvlh_relative_derived_state.hh
- lvlh_relative_derived_state.cc

8.6 jeod::NedDerivedState Class Reference

The class used for deriving the North-East-Down representations of a subject DynBody's state.

```
#include <ned_derived_state.hh>
```

Inheritance diagram for jeod::NedDerivedState:



Public Member Functions

- NedDerivedState ()

  NedDerivedState default constructor.
- ∼NedDerivedState ()

  NedDerivedState destructor.
- virtual void initialize (DynBody &subject_body, DynManager &dyn_manager)

  Begin initialization of a LvlhDerivedState.
- virtual void update (void)

  Update the state.

Data Fields

- bool register_frame

  If set (default), the NED frame will be registered with the dynamics manager at initialization time.
- NorthEastDown ned_state

  The NorthEastDown frame plus spherical/elliptical selector.

Protected Member Functions

- void compute_ned_frame (const RefFrameTrans &rel_trans)

  Update the state.

Protected Attributes

- RefFrame $*$ planet_centered_planet_fixed

  The rotating frame with origin at the center of the specified planet.
- RefFrameState pfix_rel_state

  Vehicle state relative to the planet-center, planet-fixed frame.

Private Member Functions

- NedDerivedState (const NedDerivedState &)
- NedDerivedState & operator= (const NedDerivedState &)

Friends

- class InputProcessor
- void init_attrjeod__NedDerivedState ()

8.6.1 Detailed Description

The class used for deriving the North-East-Down representations of a subject DynBody's state.

Definition at line 87 of file ned_derived_state.hh.

8.6.2 Constructor & Destructor Documentation

8.6.2.1 NedDerivedState() [1/2]

```
jeod::NedDerivedState::NedDerivedState (
            void   )
```

NedDerivedState default constructor.

Definition at line 53 of file ned_derived_state.cc.

8.6.2.2 ∼NedDerivedState()

```
jeod::NedDerivedState::∼NedDerivedState (
            void   )
```

NedDerivedState destructor.

Definition at line 69 of file ned_derived_state.cc.

References ned_state, planet_centered_planet_fixed, and register_frame.

8.6.2.3 NedDerivedState() [2/2]

```
jeod::NedDerivedState::NedDerivedState (
            const NedDerivedState &   )   [private]
```

8.6.3 Member Function Documentation

8.6.3.1 compute_ned_frame()

```
void jeod::NedDerivedState::compute_ned_frame (
            const RefFrameTrans & rel_trans )   [protected]
```

Update the state.

Parameters

in	*rel_trans*	Planet relative state

Definition at line 152 of file ned_derived_state.cc.

References ned_state.

Referenced by update().

8.6.3.2 initialize()

```
void jeod::NedDerivedState::initialize (
            DynBody & subject_body,
            DynManager & dyn_manager )  [virtual]
```

Begin initialization of a LvlhDerivedState.

The initialize method for all subclasses of DerivedState *must* pass the initialize call to their immediate parent class, which in turn must do the same, eventually invoking this method.

Parameters

in,out	*subject_body*	Subject body
in,out	*dyn_manager*	Dynamics manager

Reimplemented from jeod::DerivedState.

Definition at line 99 of file ned_derived_state.cc.

References jeod::DerivedState::find_planet(), jeod::DerivedState::initialize(), ned_state, planet_centered_planet_fixed, jeod::DerivedState::reference_name, and register_frame.

8.6.3.3 operator=()

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

8.6.3.4 update()

```
void jeod::NedDerivedState::update (
            void  )  [virtual]
```

Update the state.

Reimplemented from jeod::DerivedState.

Definition at line 134 of file ned_derived_state.cc.

References compute_ned_frame(), ned_state, pfix_rel_state, planet_centered_planet_fixed, and jeod::DerivedState::subject.

8.6.4 Friends And Related Function Documentation

8.6.4.1 init_attrjeod__NedDerivedState

```
void init_attrjeod__NedDerivedState ( )  [friend]
```

8.6.4.2 InputProcessor

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

Definition at line 89 of file ned_derived_state.hh.

8.6.5 Field Documentation

8.6.5.1 ned_state

```
NorthEastDown jeod::NedDerivedState::ned_state
```

The NorthEastDown frame plus spherical/elliptical selector.

trick_units(–)

Definition at line 106 of file ned_derived_state.hh.

Referenced by compute_ned_frame(), initialize(), update(), and ∼NedDerivedState().

8.6.5.2 pfix_rel_state

```
RefFrameState jeod::NedDerivedState::pfix_rel_state  [protected]
```

Vehicle state relative to the planet-center, planet-fixed frame.

trick_units(–)

Definition at line 119 of file ned_derived_state.hh.

Referenced by update().

8.6.5.3 planet_centered_planet_fixed

```
RefFrame* jeod::NedDerivedState::planet_centered_planet_fixed  [protected]
```

The rotating frame with origin at the center of the specified planet.

trick_units(–)

Definition at line 114 of file ned_derived_state.hh.

Referenced by initialize(), update(), and ∼NedDerivedState().

8.6.5.4 register_frame

```
bool jeod::NedDerivedState::register_frame
```

If set (default), the NED frame will be registered with the dynamics manager at initialization time.

This will make the frame accessible through the dynamic manager via its find_ref_frame method.trick_units(–)

Definition at line 101 of file ned_derived_state.hh.

Referenced by initialize(), and ∼NedDerivedState().

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

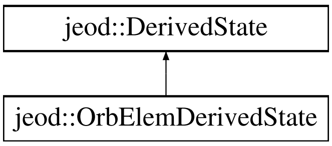
- ned_derived_state.hh
- ned_derived_state.cc

8.7 jeod::OrbElemDerivedState Class Reference

The class used for deriving the orbital elements representation of a subject DynBody's position.

```
#include <orb_elem_derived_state.hh>
```

Inheritance diagram for jeod::OrbElemDerivedState:



Public Member Functions

- OrbElemDerivedState ()

  Construct a OrbElemDerivedState object.
- ∼OrbElemDerivedState ()

  Destruct a OrbElemDerivedState object.
- virtual void initialize (DynBody &subject_body, DynManager &dyn_manager)

  Begin initialization of a OrbElemDerivedState.
- void set_use_alt_inertial (const bool use_alt_inertial_in)

  Determine whether or not this instance uses the planet's alternate inertial frame.
- virtual void update (void)

  Update the state.

Data Fields

- OrbitalElements elements

  The orbital elements of the subject body with respect to the planet specified by the reference name.

Protected Member Functions

- void compute_orbital_elements (const RefFrameTrans &rel_trans)

  Compute the orbital elements for the current state.

Protected Attributes

- Planet ∗ planet

  Planet about which the object orbits.
- RefFrameState rel_state

  Relative state; only used when the vehicle integration from is not the planet-centered inertial frame.
- bool use_alt_inertial
- EphemerisRefFrame ∗ ref_frame_ptr

Private Member Functions

- OrbElemDerivedState (const OrbElemDerivedState &)
- OrbElemDerivedState & operator= (const OrbElemDerivedState &)

Friends

- class InputProcessor
- void init_attrjeod__OrbElemDerivedState ()

8.7.1 Detailed Description

The class used for deriving the orbital elements representation of a subject DynBody's position.

Definition at line 87 of file orb_elem_derived_state.hh.

8.7.2 Constructor & Destructor Documentation

8.7.2.1 OrbElemDerivedState() [1/2]

```
jeod::OrbElemDerivedState::OrbElemDerivedState (
            void  )
```

Construct a OrbElemDerivedState object.

Definition at line 49 of file orb_elem_derived_state.cc.

8.7.2.2 ∼OrbElemDerivedState()

```
jeod::OrbElemDerivedState::∼OrbElemDerivedState (
            void  )
```

Destruct a OrbElemDerivedState object.

Definition at line 64 of file orb_elem_derived_state.cc.

References ref_frame_ptr.

8.7.2.3 OrbElemDerivedState() [2/2]

```
jeod::OrbElemDerivedState::OrbElemDerivedState (
            const OrbElemDerivedState &  )  [private]
```

8.7.3 Member Function Documentation

8.7.3.1 compute_orbital_elements()

```
void jeod::OrbElemDerivedState::compute_orbital_elements (
            const RefFrameTrans & rel_trans )  [protected]
```

Compute the orbital elements for the current state.

Parameters

in	*rel_trans*	Planet relative state.

Definition at line 159 of file orb_elem_derived_state.cc.

References elements, and planet.

Referenced by update().

8.7.3.2 initialize()

```
void jeod::OrbElemDerivedState::initialize (
            DynBody & subject_body,
            DynManager & dyn_manager )  [virtual]
```

Begin initialization of a OrbElemDerivedState.

The initialize method for all subclasses of DerivedState *must* pass the initialize call to their immediate parent class, which in turn must do the same, eventually invoking this method.

Parameters

in,out	*subject_body*	Subject body
in,out	*dyn_manager*	Dynamics manager

Reimplemented from jeod::DerivedState.

Definition at line 97 of file orb_elem_derived_state.cc.

References elements, jeod::DerivedState::find_planet(), jeod::DerivedState::initialize(), planet, ref_frame_ptr, jeod::DerivedState::reference_name, and use_alt_inertial.

8.7.3.3 operator=()

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

8.7.3.4 set_use_alt_inertial()

```
void jeod::OrbElemDerivedState::set_use_alt_inertial (
            const bool use_alt_inertial_in )
```

Determine whether or not this instance uses the planet's alternate inertial frame.

Definition at line 80 of file orb_elem_derived_state.cc.

References use_alt_inertial.

8.7.3.5 update()

```
void jeod::OrbElemDerivedState::update (
            void ) [virtual]
```

Update the state.

Reimplemented from jeod::DerivedState.

Definition at line 133 of file orb_elem_derived_state.cc.

References compute_orbital_elements(), ref_frame_ptr, rel_state, jeod::DerivedState::subject, and jeod::DerivedState::update().

8.7.4 Friends And Related Function Documentation

8.7.4.1 init_attrjeod__OrbElemDerivedState

```
void init_attrjeod__OrbElemDerivedState ( ) [friend]
```

8.7.4.2 InputProcessor

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

Definition at line 89 of file orb_elem_derived_state.hh.

8.7.5 Field Documentation

8.7.5.1 elements

```
OrbitalElements jeod::OrbElemDerivedState::elements
```

The orbital elements of the subject body with respect to the planet specified by the reference name.

trick_units(–)

Definition at line 100 of file orb_elem_derived_state.hh.

Referenced by compute_orbital_elements(), and initialize().

8.7.5.2 planet

```
Planet* jeod::OrbElemDerivedState::planet  [protected]
```

Planet about which the object orbits.

trick_units(–)

Definition at line 108 of file orb_elem_derived_state.hh.

Referenced by compute_orbital_elements(), and initialize().

8.7.5.3 ref_frame_ptr

```
EphemerisRefFrame* jeod::OrbElemDerivedState::ref_frame_ptr  [protected]
```

Definition at line 146 of file orb_elem_derived_state.hh.

Referenced by initialize(), update(), and ∼OrbElemDerivedState().

8.7.5.4 rel_state

```
RefFrameState jeod::OrbElemDerivedState::rel_state  [protected]
```

Relative state; only used when the vehicle integration from is not the planet-centered inertial frame.

trick_units(–)

Definition at line 114 of file orb_elem_derived_state.hh.

Referenced by update().

8.7.5.5 use_alt_inertial

```
bool jeod::OrbElemDerivedState::use_alt_inertial  [protected]
```

Definition at line 144 of file orb_elem_derived_state.hh.

Referenced by initialize(), and set_use_alt_inertial().

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

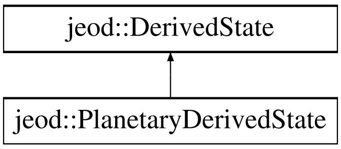
- orb_elem_derived_state.hh
- orb_elem_derived_state.cc

8.8 jeod::PlanetaryDerivedState Class Reference

The class used for deriving the planet-fixed representations of a subject DynBody's position.

```
#include <planetary_derived_state.hh>
```

Inheritance diagram for jeod::PlanetaryDerivedState:



Public Member Functions

- PlanetaryDerivedState ()

  Construct a PlanetaryDerivedState object.
- ∼PlanetaryDerivedState ()

  Destruct a PlanetaryDerivedState object.
- virtual void initialize (DynBody &subject_body, DynManager &dyn_manager)

  Begin initialization of a PlanetaryDerivedState.
- virtual void update (void)

  Update the state.

Data Fields

- Planet ∗ planet

  The planet, the name of which is specified by the inherited reference_name data member.
- PlanetFixedPosition state

  The planet-fixed state of the subject body's composite CoM.

Private Member Functions

- PlanetaryDerivedState (const PlanetaryDerivedState &)
- PlanetaryDerivedState & operator= (const PlanetaryDerivedState &)

Friends

- class InputProcessor
- void init_attrjeod__PlanetaryDerivedState ()

Additional Inherited Members

8.8.1 Detailed Description

The class used for deriving the planet-fixed representations of a subject DynBody's position.

Definition at line 86 of file planetary_derived_state.hh.

8.8.2 Constructor & Destructor Documentation

8.8.2.1 PlanetaryDerivedState() [1/2]

```
jeod::PlanetaryDerivedState::PlanetaryDerivedState (
             void  )
```

Construct a PlanetaryDerivedState object.

Definition at line 48 of file planetary_derived_state.cc.

8.8.2.2 ∼PlanetaryDerivedState()

```
jeod::PlanetaryDerivedState::∼PlanetaryDerivedState (
             void  )
```

Destruct a PlanetaryDerivedState object.

Definition at line 105 of file planetary_derived_state.cc.

References planet.

8.8.2.3 PlanetaryDerivedState() [2/2]

```
jeod::PlanetaryDerivedState::PlanetaryDerivedState (
             const PlanetaryDerivedState &  )  [private]
```

8.8.3 Member Function Documentation

8.8.3.1 initialize()

```
void jeod::PlanetaryDerivedState::initialize (
             DynBody & subject_body,
             DynManager & dyn_manager )  [virtual]
```

Begin initialization of a PlanetaryDerivedState.

The initialize method for all subclasses of DerivedState *must* pass the initialize call to their immediate parent class, which in turn must do the same, eventually invoking this method.

Parameters

in,out	*subject_body*	Subject body
in,out	*dyn_manager*	Dynamics manager

Reimplemented from jeod::DerivedState.

Definition at line 65 of file planetary_derived_state.cc.

References jeod::DerivedState::find_planet(), jeod::DerivedState::initialize(), planet, jeod::DerivedState::reference_name, and state.

8.8.3.2 operator=()

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

8.8.3.3 update()

```
void jeod::PlanetaryDerivedState::update (
             void ) [virtual]
```

Update the state.

Reimplemented from jeod::DerivedState.

Definition at line 90 of file planetary_derived_state.cc.

References planet, state, and jeod::DerivedState::subject.

8.8.4 Friends And Related Function Documentation

8.8.4.1 init_attrjeod__PlanetaryDerivedState

```
void init_attrjeod__PlanetaryDerivedState ( ) [friend]
```

8.8.4.2 InputProcessor

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

Definition at line 88 of file planetary_derived_state.hh.

8.8.5 Field Documentation

8.8.5.1 planet

```
Planet* jeod::PlanetaryDerivedState::planet
```

The planet, the name of which is specified by the inherited reference_name data member.

trick_units(–)

Definition at line 99 of file planetary_derived_state.hh.

Referenced by initialize(), update(), and ∼PlanetaryDerivedState().

8.8.5.2 state

```
PlanetFixedPosition jeod::PlanetaryDerivedState::state
```

The planet-fixed state of the subject body's composite CoM.

trick_units(–)

Definition at line 104 of file planetary_derived_state.hh.

Referenced by initialize(), and update().

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

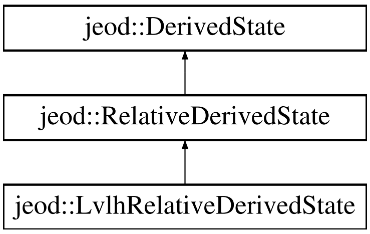
- planetary_derived_state.hh
- planetary_derived_state.cc

8.9 jeod::RelativeDerivedState Class Reference

The class used for deriving the state of some frame associated with the subject DynBody relative to some other target frame.

```
#include <relative_derived_state.hh>
```

Inheritance diagram for jeod::RelativeDerivedState:



Public Types

- enum DirectionSense { undefined = -1, ComputeSubjectStateinTarget = 0, ComputeTargetStateinSubject = 2 }

  an enumeration to specify the direction and sense, and frame representation intended for output from the RelativeDerivedState calculations.

Public Member Functions

- RelativeDerivedState ()

  Construct a RelativeDerivedState object.
- virtual ∼RelativeDerivedState ()

  Destruct a RelativeDerivedState object.
- void set_name (std::string name_in)

  Setter for the name.
- void set_target_frame (RefFrame &tf)

  Quick shortcut allowing use of conversion routines without requiring initialization.
- void set_subject_frame (BodyRefFrame &sf)

  Quick shortcut allowing use of conversion routines without requiring initialization.
- virtual void initialize (DynBody &subject_body, DynManager &dyn_manager)

  Begin initialization of a RelativeDerivedState.
- virtual void initialize (DynManager &dyn_manager)

  Initialize a RelativeDerivedState, without a DynBody.
- virtual void update (void)

  Update the state.
- void set_activation_flag (bool raf)

  Setter for the activation flag to on or off and If off, unsubscribes subject and target frames /param raf RelativeDerivedState activation flag for RelKin manager.

Data Fields

- std::string name

  The name of this relative derived state.
- char ∗ subject_frame_name

  The name of the frame on the subject vehicle.
- char ∗ target_frame_name

  The name of the target reference frame.
- DirectionSense direction_sense

  Indicates direction in which relative state is to be computed.
- RefFrameState rel_state

  Computed relative state.
- bool active

  Bool flag used by the RelKin model to turn on/off which Relative Derived State needs to be managed.

Protected Attributes

- BodyRefFrame ∗ subject_frame

  The reference frame corresponding to the user-input subject_frame_name.
- RefFrame ∗ target_frame

  The reference frame corresponding to the user-input target_frame_name.

Private Member Functions

- RelativeDerivedState (const RelativeDerivedState &)
- RelativeDerivedState & operator= (const RelativeDerivedState &)

Friends

- class InputProcessor
- void init_attrjeod__RelativeDerivedState ()

Additional Inherited Members

8.9.1 Detailed Description

The class used for deriving the state of some frame associated with the subject DynBody relative to some other target frame.

Definition at line 90 of file relative_derived_state.hh.

8.9.2 Member Enumeration Documentation

8.9.2.1 DirectionSense

```
enum jeod::RelativeDerivedState::DirectionSense
```

an enumeration to specify the direction and sense, and frame representation intended for output from the RelativeDerivedState calculations.

Enumerator

undefined	
ComputeSubjectStateinTarget	
ComputeTargetStateinSubject	

Definition at line 104 of file relative_derived_state.hh.

8.9.3 Constructor & Destructor Documentation

8.9.3.1 RelativeDerivedState() [1/2]

```
jeod::RelativeDerivedState::RelativeDerivedState (
            void  )
```

Construct a RelativeDerivedState object.

Definition at line 52 of file relative_derived_state.cc.

8.9.3.2 ∼RelativeDerivedState()

```
jeod::RelativeDerivedState::∼RelativeDerivedState (
            void ) [virtual]
```

Destruct a RelativeDerivedState object.

Definition at line 70 of file relative_derived_state.cc.

References subject_frame, and target_frame.

8.9.3.3 RelativeDerivedState() [2/2]

```
jeod::RelativeDerivedState::RelativeDerivedState (
            const RelativeDerivedState & ) [private]
```

8.9.4 Member Function Documentation

8.9.4.1 initialize() [1/2]

```
void jeod::RelativeDerivedState::initialize (
            DynBody & subject_body,
            DynManager & dyn_manager ) [virtual]
```

Begin initialization of a RelativeDerivedState.

The initialize method for all subclasses of DerivedState *must* pass the initialize call to their immediate parent class, which in turn must do the same, eventually invoking this method.

Parameters

in,out	*subject_body*	Subject body
in,out	*dyn_manager*	Dynamics manager

Reimplemented from jeod::DerivedState.

Reimplemented in jeod::LvlhRelativeDerivedState.

Definition at line 93 of file relative_derived_state.cc.

References jeod::DerivedState::initialize().

Referenced by jeod::LvlhRelativeDerivedState::initialize().

8.9.4.2 initialize() [2/2]

```
void jeod::RelativeDerivedState::initialize (
            DynManager & dyn_manager )  [virtual]
```

Initialize a RelativeDerivedState, without a DynBody.

No pass up the initialization chain is possible for this method, since it is not inherited.

Parameters

in,out	*dyn_manager*	Dynamics manager

Definition at line 114 of file relative_derived_state.cc.

References jeod::DerivedStateMessages::invalid_name, jeod::DerivedState::state_identifier, jeod::DerivedState↵ ::subject, subject_frame, subject_frame_name, target_frame, and target_frame_name.

8.9.4.3 operator=()

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

8.9.4.4 set_activation_flag()

```
void jeod::RelativeDerivedState::set_activation_flag (
            bool raf )
```

Setter for the activation flag to on or off and If off, unsubscribes subject and target frames /param raf RelativeDerivedState activation flag for RelKin manager.

Definition at line 227 of file relative_derived_state.cc.

References active, subject_frame, and target_frame.

8.9.4.5 set_name()

```
void jeod::RelativeDerivedState::set_name (
             std::string name_in )  [inline]
```

Setter for the name.

Definition at line 181 of file relative_derived_state.hh.

References name.

8.9.4.6 set_subject_frame()

```
void jeod::RelativeDerivedState::set_subject_frame (
             BodyRefFrame & sf )  [inline]
```

Quick shortcut allowing use of conversion routines without requiring initialization.

Parameters

sf	New subject frame.

Definition at line 198 of file relative_derived_state.hh.

References subject_frame.

8.9.4.7 set_target_frame()

```
void jeod::RelativeDerivedState::set_target_frame (
             RefFrame & tf )  [inline]
```

Quick shortcut allowing use of conversion routines without requiring initialization.

Parameters

tf	New target frame.

Definition at line 191 of file relative_derived_state.hh.

References target_frame.

8.9.4.8 update()

```
void jeod::RelativeDerivedState::update (
             void  )  [virtual]
```

Update the state.

Reimplemented from jeod::DerivedState.

Reimplemented in jeod::LvlhRelativeDerivedState.

Definition at line 199 of file relative_derived_state.cc.

References ComputeSubjectStateinTarget, ComputeTargetStateinSubject, direction_sense, jeod::DerivedState↩ Messages::illegal_value, rel_state, subject_frame, and target_frame.

8.9.5 Friends And Related Function Documentation

8.9.5.1 init_attrjeod__RelativeDerivedState

```
void init_attrjeod__RelativeDerivedState ( )  [friend]
```

8.9.5.2 InputProcessor

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

Definition at line 92 of file relative_derived_state.hh.

8.9.6 Field Documentation

8.9.6.1 active

```
bool jeod::RelativeDerivedState::active
```

Bool flag used by the RelKin model to turn on/off which Relative Derived State needs to be managed.

trick_units(–)

Definition at line 154 of file relative_derived_state.hh.

Referenced by set_activation_flag().

8.9.6.2 direction_sense

```
DirectionSense jeod::RelativeDerivedState::direction_sense
```

Indicates direction in which relative state is to be computed.

trick_units(–)

Definition at line 143 of file relative_derived_state.hh.

Referenced by jeod::LvlhRelativeDerivedState::LvlhRelativeDerivedState(), and update().

8.9.6.3 name

```
std::string jeod::RelativeDerivedState::name
```

The name of this relative derived state.

trick_units(–)

Definition at line 123 of file relative_derived_state.hh.

Referenced by jeod::LvlhRelativeDerivedState::convert_circ_to_rect(), jeod::LvlhRelativeDerivedState::convert_↩ rect_to_circ(), and set_name().

8.9.6.4 rel_state

```
RefFrameState jeod::RelativeDerivedState::rel_state
```

Computed relative state.

trick_units(–)

Definition at line 148 of file relative_derived_state.hh.

Referenced by jeod::LvlhRelativeDerivedState::convert_circ_to_rect(), jeod::LvlhRelativeDerivedState::convert_↩ rect_to_circ(), jeod::LvlhRelativeDerivedState::update(), and update().

8.9.6.5 subject_frame

```
BodyRefFrame* jeod::RelativeDerivedState::subject_frame [protected]
```

The reference frame corresponding to the user-input subject_frame_name.

trick_units(–)

Definition at line 162 of file relative_derived_state.hh.

Referenced by initialize(), set_activation_flag(), set_subject_frame(), jeod::LvlhRelativeDerivedState::update(), update(), and ∼RelativeDerivedState().

8.9.6.6 subject_frame_name

```
char* jeod::RelativeDerivedState::subject_frame_name
```

The name of the frame on the subject vehicle.

This can specify one of the vehicle's three primary reference frames (core body, composite body, or structure) or one of the vehicle's vehicle point frames. The vehicle name can be included in or omitted from the subject frame name. A vehicle name prefix is assumed if it is omitted.trick_units(–)

Definition at line 133 of file relative_derived_state.hh.

Referenced by initialize().

8.9.6.7 target_frame

```
RefFrame* jeod::RelativeDerivedState::target_frame [protected]
```

The reference frame corresponding to the user-input target_frame_name.

trick_units(–)

Definition at line 167 of file relative_derived_state.hh.

Referenced by jeod::LvlhRelativeDerivedState::convert_circ_to_rect(), jeod::LvlhRelativeDerivedState::convert_↩ rect_to_circ(), jeod::LvlhRelativeDerivedState::do_theta_dot_correction(), initialize(), set_activation_flag(), set_↩ target_frame(), jeod::LvlhRelativeDerivedState::update(), update(), and ∼RelativeDerivedState().

8.9.6.8 target_frame_name

```
char* jeod::RelativeDerivedState::target_frame_name
```

The name of the target reference frame.

trick_units(–)

Definition at line 138 of file relative_derived_state.hh.

Referenced by initialize().

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

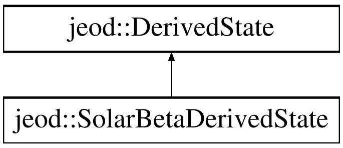
- relative_derived_state.hh
- relative_derived_state.cc

8.10 jeod::SolarBetaDerivedState Class Reference

The class for calculating the solar beta of a vehicle.

```
#include <solar_beta_derived_state.hh>
```

Inheritance diagram for jeod::SolarBetaDerivedState:



Public Member Functions

- SolarBetaDerivedState ()

  Construct a SolarBetaDerivedState object.
- virtual ∼SolarBetaDerivedState ()

  Destruct a SolarBetaDerivedState.
- virtual void initialize (DynBody &subject_body, DynManager &dyn_manager)

  Begin initialization of a SolarBetaDerivedState.
- virtual void update (void)

  Update the state.

Data Fields

- Planet ∗ planet

  The planet, the name of which is specified by the inherited reference_name data member.
- Planet ∗ sun

  The sun, found by looking for the planetary object named "Sun".
- double solar_beta

  The angle between the orbital plane and the sun position vector.
- bool active

  Indicates whether the model is "active".

Protected Attributes

- RefFrameState veh_wrt_planet

  The state of the vehicle with respect to the planet.
- double sun_wrt_planet [3]

  The position of the sun with respect to the planet.

Private Member Functions

- SolarBetaDerivedState (const SolarBetaDerivedState &)
- SolarBetaDerivedState & operator= (const SolarBetaDerivedState &)

Friends

- class InputProcessor
- void init_attrjeod__SolarBetaDerivedState ()

Additional Inherited Members

8.10.1 Detailed Description

The class for calculating the solar beta of a vehicle.

Assumptions and Limitations

- The vehicle must be in orbit about the named planet

Definition at line 83 of file solar_beta_derived_state.hh.

8.10.2 Constructor & Destructor Documentation

8.10.2.1 SolarBetaDerivedState() [1/2]

```
jeod::SolarBetaDerivedState::SolarBetaDerivedState (
                void  )
```

Construct a SolarBetaDerivedState object.

Definition at line 59 of file solar_beta_derived_state.cc.

References sun_wrt_planet.

8.10.2.2 ∼SolarBetaDerivedState()

```
jeod::SolarBetaDerivedState::∼SolarBetaDerivedState (
                void  )  [virtual]
```

Destruct a SolarBetaDerivedState.

Definition at line 170 of file solar_beta_derived_state.cc.

References planet, and sun.

8.10.2.3 SolarBetaDerivedState() [2/2]

```
jeod::SolarBetaDerivedState::SolarBetaDerivedState (
            const SolarBetaDerivedState & )  [private]
```

8.10.3 Member Function Documentation

8.10.3.1 initialize()

```
void jeod::SolarBetaDerivedState::initialize (
            DynBody & subject_body,
            DynManager & dyn_manager )  [virtual]
```

Begin initialization of a SolarBetaDerivedState.

The initialize method for all subclasses of DerivedState *must* pass the initialize call to their immediate parent class, which in turn must do the same, eventually invoking this method.

Parameters

in,out	*subject_body*	Subject body
in,out	*dyn_manager*	Dynamics manager

Reimplemented from jeod::DerivedState.

Definition at line 80 of file solar_beta_derived_state.cc.

References active, jeod::DerivedState::find_planet(), jeod::DerivedState::initialize(), planet, jeod::DerivedState::reference_name, and sun.

8.10.3.2 operator=()

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

8.10.3.3 update()

```
void jeod::SolarBetaDerivedState::update (
            void )  [virtual]
```

Update the state.

Reimplemented from jeod::DerivedState.

Definition at line 109 of file solar_beta_derived_state.cc.

References active, jeod::DerivedStateMessages::divide_by_zero, EPSILON, planet, solar_beta, jeod::DerivedState::subject, sun, sun_wrt_planet, and veh_wrt_planet.

8.10.4 Friends And Related Function Documentation

8.10.4.1 init_attrjeod__SolarBetaDerivedState

```
void init_attrjeod__SolarBetaDerivedState ( )  [friend]
```

8.10.4.2 InputProcessor

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

Definition at line 85 of file solar_beta_derived_state.hh.

8.10.5 Field Documentation

8.10.5.1 active

```
bool jeod::SolarBetaDerivedState::active
```

Indicates whether the model is "active".

This flag defaults to true. This default value results in

- Initialization-time subscriptions issued against the planet-centered and sun-centered inertial frames to ensure that the planet and the Sun are a part of the active reference frame tree, and
- Run-time calculations of the solar beta angle, updated by calls to SolarBetaDerivedState::update.

Setting the active flag to false prior to the call to SolarBetaDerivedState::initialize permanently disables the model. Setting the active flag to true after having set it to false prior to the call to initialize initially will have no effect; the model is permanently disabled.

If the value of the flag is true at the time of the call to SolarBetaDerivedState::initialize, subsequently setting the flag to false will temporarily disable the model (cause SolarBetaDerivedState::update to immediately return). Updates will once again be performed when the flag is set to true.trick_units(--)

Definition at line 136 of file solar_beta_derived_state.hh.

Referenced by initialize(), and update().

8.10.5.2 planet

```
Planet* jeod::SolarBetaDerivedState::planet
```

The planet, the name of which is specified by the inherited reference_name data member.

trick_units(–)

Definition at line 99 of file solar_beta_derived_state.hh.

Referenced by initialize(), update(), and ∼SolarBetaDerivedState().

8.10.5.3 solar_beta

```
double jeod::SolarBetaDerivedState::solar_beta
```

The angle between the orbital plane and the sun position vector.

Positive solar beta will be on the side of the positive angular momentum vector.trick_units(rad)

Definition at line 111 of file solar_beta_derived_state.hh.

Referenced by update().

8.10.5.4 sun

```
Planet* jeod::SolarBetaDerivedState::sun
```

The sun, found by looking for the planetary object named "Sun".

trick_units(–)

Definition at line 104 of file solar_beta_derived_state.hh.

Referenced by initialize(), update(), and ∼SolarBetaDerivedState().

8.10.5.5 sun_wrt_planet

```
double jeod::SolarBetaDerivedState::sun_wrt_planet[3]  [protected]
```

The position of the sun with respect to the planet.

trick_units(m)

Definition at line 170 of file solar_beta_derived_state.hh.

Referenced by SolarBetaDerivedState(), and update().

8.10.5.6 veh_wrt_planet

```
RefFrameState jeod::SolarBetaDerivedState::veh_wrt_planet  [protected]
```

The state of the vehicle with respect to the planet.

trick_units(–)

Definition at line 165 of file solar_beta_derived_state.hh.

Referenced by update().

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

- solar_beta_derived_state.hh
- solar_beta_derived_state.cc

Chapter 9

File Documentation

9.1 class_declarations.hh File Reference

Forward declarations of classes defined in XXX_derived_state.hh files.

Namespaces

- jeod

  Namespace jeod.

9.1.1 Detailed Description

Forward declarations of classes defined in XXX_derived_state.hh files.

9.2 derived_state.cc File Reference

Define methods for the base body initialization class.

```
#include <cstddef>
#include <typeinfo>
#include "dynamics/dyn_body/include/dyn_body.hh"
#include "dynamics/dyn_manager/include/dyn_manager.hh"
#include "utils/memory/include/jeod_alloc.hh"
#include "utils/message/include/message_handler.hh"
#include "utils/named_item/include/named_item.hh"
#include "../include/derived_state.hh"
#include "../include/derived_state_messages.hh"
```

Namespaces

- jeod

  Namespace jeod.

9.2.1 Detailed Description

Define methods for the base body initialization class.

9.3 derived_state.hh File Reference

Define the class DerivedState, the base class used for deriving a state representation of some subject DynBody.

```
#include "dynamics/dyn_body/include/class_declarations.hh"
#include "dynamics/dyn_manager/include/class_declarations.hh"
#include "environment/planet/include/class_declarations.hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include "class_declarations.hh"
#include "dynamics/dyn_body/include/dyn_body.hh"
```

Data Structures

- class jeod::DerivedState

  The base class used for deriving a state representation of some subject DynBody.

Namespaces

- jeod

  Namespace jeod.

9.3.1 Detailed Description

Define the class DerivedState, the base class used for deriving a state representation of some subject DynBody.

9.4 derived_state_messages.cc File Reference

Implement the class DerivedStateMessages.

```
#include "../include/derived_state_messages.hh"
```

Namespaces

- jeod

  Namespace jeod.

Macros

- #define PATH "dynamics/derived_state/"

9.4.1 Detailed Description

Implement the class DerivedStateMessages.

9.5 derived_state_messages.hh File Reference

Define the class DerivedStateMessages, the class that specifies the message IDs used in the DerivedState model.

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

Data Structures

- class jeod::DerivedStateMessages

  The class that specifies the message IDs used in the DerivedState model.

Namespaces

- jeod

  Namespace jeod.

9.5.1 Detailed Description

Define the class DerivedStateMessages, the class that specifies the message IDs used in the DerivedState model.

9.6 euler_derived_state.cc File Reference

Define methods for the Euler attitude derived state class.

```
#include <cstddef>
#include "dynamics/dyn_body/include/dyn_body.hh"
#include "utils/math/include/matrix3x3.hh"
#include "utils/orientation/include/orientation.hh"
#include "../include/euler_derived_state.hh"
```

Namespaces

- jeod

  Namespace jeod.

9.6.1 Detailed Description

Define methods for the Euler attitude derived state class.

9.7 euler_derived_state.hh File Reference

Define the class EulerDerivedState, the class used for deriving the Euler angle representation of a subject Dyn←↩ Body's attitude.

```
#include "dynamics/dyn_body/include/class_declarations.hh"
#include "dynamics/dyn_manager/include/class_declarations.hh"
#include "utils/orientation/include/orientation.hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include "utils/ref_frames/include/class_declarations.hh"
#include "utils/ref_frames/include/ref_frame_state.hh"
#include "derived_state.hh"
```

Data Structures

- class jeod::EulerDerivedState

  The class used for deriving the Euler angle representation of a subject DynBody's attitude.

Namespaces

- jeod

  Namespace jeod.

9.7.1 Detailed Description

Define the class EulerDerivedState, the class used for deriving the Euler angle representation of a subject Dyn←↩ Body's attitude.

9.8 lvlh_derived_state.cc File Reference

Define methods for the base body initialization class.

```
#include <cstddef>
#include "dynamics/dyn_body/include/dyn_body.hh"
#include "dynamics/dyn_manager/include/dyn_manager.hh"
#include "environment/planet/include/planet.hh"
#include "utils/math/include/vector3.hh"
#include "../include/lvlh_derived_state.hh"
```

Namespaces

- jeod

  Namespace jeod.

9.8.1 Detailed Description

Define methods for the base body initialization class.

9.9 lvlh_derived_state.hh File Reference

Define the class LvlhDerivedState, the class used for deriving the rectilinear LVLH representations of a subject DynBody's state.

```
#include "dynamics/dyn_body/include/class_declarations.hh"
#include "dynamics/dyn_manager/include/class_declarations.hh"
#include "utils/lvlh_frame/include/lvlh_frame.hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include "derived_state.hh"
```

Data Structures

- class jeod::LvlhDerivedState

    The class used for deriving the rectilinear LVLH representations of a subject DynBody's state.

Namespaces

- jeod

    Namespace jeod.

9.9.1 Detailed Description

Define the class LvlhDerivedState, the class used for deriving the rectilinear LVLH representations of a subject DynBody's state.

9.10 lvlh_relative_derived_state.cc File Reference

Define methods for the LVLH relative state class.

```
#include <cstddef>
#include "dynamics/dyn_body/include/dyn_body.hh"
#include "dynamics/dyn_manager/include/dyn_manager.hh"
#include "utils/math/include/matrix3x3.hh"
#include "utils/math/include/vector3.hh"
#include "utils/message/include/message_handler.hh"
#include "../include/lvlh_relative_derived_state.hh"
#include "../include/derived_state_messages.hh"
```

Namespaces

- jeod

  Namespace jeod.

9.10.1 Detailed Description

Define methods for the LVLH relative state class.

9.11 lvlh_relative_derived_state.hh File Reference

Define the class LvlhRelativeDerivedState, the class used for calculating the LVLH state of a subject DynBody relative to some LVLH reference frame.

```
#include "dynamics/dyn_body/include/class_declarations.hh"
#include "dynamics/dyn_manager/include/class_declarations.hh"
#include "environment/planet/include/base_planet.hh"
#include "utils/lvlh_frame/include/lvlh_type.hh"
#include "utils/ref_frames/include/class_declarations.hh"
#include "utils/ref_frames/include/ref_frame_state.hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include "relative_derived_state.hh"
```

Data Structures

- class jeod::LvlhRelativeDerivedState

  The class used for calculating the LVLH state of a subject DynBody relative to some LVLH reference frame.

Namespaces

- jeod

  Namespace jeod.

9.11.1 Detailed Description

Define the class LvlhRelativeDerivedState, the class used for calculating the LVLH state of a subject DynBody relative to some LVLH reference frame.

9.12 ned_derived_state.cc File Reference

Define methods for NedDerivedState.

```
#include <cstddef>
#include "dynamics/dyn_body/include/dyn_body.hh"
#include "dynamics/dyn_manager/include/dyn_manager.hh"
#include "environment/planet/include/planet.hh"
#include "utils/planet_fixed/north_east_down/include/north_east_down.hh"
#include "utils/ref_frames/include/ref_frame_state.hh"
#include "../include/ned_derived_state.hh"
```

Namespaces

- jeod

  Namespace jeod.

9.12.1 Detailed Description

Define methods for NedDerivedState.

9.13 ned_derived_state.hh File Reference

Define the class NedDerivedState, the class used for deriving the NED representations of a subject DynBody's state.

```
#include "dynamics/dyn_body/include/class_declarations.hh"
#include "dynamics/dyn_manager/include/class_declarations.hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include "utils/planet_fixed/north_east_down/include/north_east_down.hh"
#include "utils/ref_frames/include/class_declarations.hh"
#include "utils/ref_frames/include/ref_frame_state.hh"
#include "derived_state.hh"
```

Data Structures

- class jeod::NedDerivedState

  The class used for deriving the North-East-Down representations of a subject DynBody's state.

Namespaces

- jeod

  Namespace jeod.

9.13.1 Detailed Description

Define the class NedDerivedState, the class used for deriving the NED representations of a subject DynBody's state.

9.14 orb_elem_derived_state.cc File Reference

Define methods for the orbital elements derived state class.

```
#include <cstddef>
#include "dynamics/dyn_body/include/dyn_body.hh"
#include "environment/planet/include/planet.hh"
#include "utils/orbital_elements/include/orbital_elements.hh"
#include "../include/orb_elem_derived_state.hh"
```

Namespaces

- jeod

  Namespace jeod.

9.14.1 Detailed Description

Define methods for the orbital elements derived state class.

9.15 orb_elem_derived_state.hh File Reference

Define the class OrbElemDerivedState, the class used for deriving the orbital elements representation of a subject DynBody's position.

```
#include "dynamics/dyn_manager/include/class_declarations.hh"
#include "dynamics/dyn_body/include/class_declarations.hh"
#include "environment/planet/include/class_declarations.hh"
#include "utils/orbital_elements/include/orbital_elements.hh"
#include "utils/ref_frames/include/ref_frame_state.hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include "derived_state.hh"
#include "environment/planet/include/planet.hh"
```

Data Structures

- class jeod::OrbElemDerivedState

  The class used for deriving the orbital elements representation of a subject DynBody's position.

Namespaces

- jeod

  Namespace jeod.

9.15.1 Detailed Description

Define the class OrbElemDerivedState, the class used for deriving the orbital elements representation of a subject DynBody's position.

9.16 planetary_derived_state.cc File Reference

Define methods for the base body initialization class.

```
#include <cstddef>
#include "dynamics/dyn_body/include/dyn_body.hh"
#include "environment/planet/include/planet.hh"
#include "../include/planetary_derived_state.hh"
```

Namespaces

- jeod

  Namespace jeod.

9.16.1 Detailed Description

Define methods for the base body initialization class.

9.17 planetary_derived_state.hh File Reference

Define the class PlanetaryDerivedState, the class used for deriving the planet-fixed representations of a subject DynBody's position.

```
#include "dynamics/dyn_manager/include/class_declarations.hh"
#include "dynamics/dyn_body/include/class_declarations.hh"
#include "environment/planet/include/class_declarations.hh"
#include "utils/planet_fixed/planet_fixed_posn/include/planet_fixed_posn.↩
hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include "derived_state.hh"
```

Data Structures

- class jeod::PlanetaryDerivedState

  The class used for deriving the planet-fixed representations of a subject DynBody's position.

Namespaces

- jeod

  Namespace jeod.

9.17.1 Detailed Description

Define the class PlanetaryDerivedState, the class used for deriving the planet-fixed representations of a subject DynBody's position.

9.18 relative_derived_state.cc File Reference

Define methods for the base body initialization class.

```
#include <cstddef>
#include "dynamics/dyn_body/include/dyn_body.hh"
#include "dynamics/dyn_manager/include/dyn_manager.hh"
#include "utils/message/include/message_handler.hh"
#include "utils/ref_frames/include/ref_frame.hh"
#include "../include/relative_derived_state.hh"
#include "../include/derived_state_messages.hh"
```

Namespaces

- jeod

  Namespace jeod.

9.18.1 Detailed Description

Define methods for the base body initialization class.

9.19 relative_derived_state.hh File Reference

Define the class RelativeDerivedState, the class used for deriving the state of some frame associated with the subject DynBody relative to some other target frame.

```
#include "derived_state.hh"
#include "dynamics/dyn_body/include/class_declarations.hh"
#include "dynamics/dyn_manager/include/class_declarations.hh"
#include "utils/ref_frames/include/class_declarations.hh"
#include "utils/ref_frames/include/ref_frame_state.hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include <string>
#include <utility>
```

Data Structures

- class jeod::RelativeDerivedState

  The class used for deriving the state of some frame associated with the subject DynBody relative to some other target frame.

Namespaces

- jeod

  Namespace jeod.

9.19.1 Detailed Description

Define the class RelativeDerivedState, the class used for deriving the state of some frame associated with the subject DynBody relative to some other target frame.

9.20 solar_beta_derived_state.cc File Reference

This function calculates the angle between a spacecraft's orbital plane and the vector from the relevant planet to the sun.

```
#include <cstddef>
#include "dynamics/dyn_body/include/dyn_body.hh"
#include "dynamics/dyn_manager/include/dyn_manager.hh"
#include "environment/planet/include/planet.hh"
#include "utils/math/include/vector3.hh"
#include "utils/memory/include/jeod_alloc.hh"
#include "utils/message/include/message_handler.hh"
#include "utils/named_item/include/named_item.hh"
#include "../include/solar_beta_derived_state.hh"
#include "../include/derived_state_messages.hh"
```

Namespaces

- jeod

  Namespace jeod.

Macros

- #define EPSILON 0.0000001

9.20.1 Detailed Description

This function calculates the angle between a spacecraft's orbital plane and the vector from the relevant planet to the sun.

9.21 solar_beta_derived_state.hh File Reference

A class for calculating the solar beta of a vehicle.

```
#include "dynamics/dyn_manager/include/class_declarations.hh"
#include "environment/planet/include/class_declarations.hh"
#include "utils/ref_frames/include/ref_frame_state.hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include "class_declarations.hh"
#include "derived_state.hh"
#include "environment/planet/include/planet.hh"
```

Data Structures

- class jeod::SolarBetaDerivedState

  The class for calculating the solar beta of a vehicle.

Namespaces

- jeod

  Namespace jeod.

9.21.1 Detailed Description

A class for calculating the solar beta of a vehicle.

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