

RadiationPressureModel

5.1

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# Chapter 1

## Module Index

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## Chapter 2

# Namespace Index

### 2.1 Namespace List

Here is a list of all namespaces with brief descriptions:

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# Hierarchical Index

### 3.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

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# Data Structure Index

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The factory for building flat plate radiation facets . . . . .	20
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Here is a list of all files with brief descriptions:

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## Chapter 6

# Module Documentation

### 6.1 Models

#### Modules

- [Interactions](#)

#### 6.1.1 Detailed Description

## 6.2 Interactions

### Modules

- [RadiationPressure](#)

### 6.2.1 Detailed Description



## 6.3 RadiationPressure

### Files

- file [flat\\_plate\\_radiation\\_facet.hh](#)  
*Individual facets for use with rad environment interaction models.*
- file [flat\\_plate\\_radiation\\_factory.hh](#)  
*Factory that creates an interaction facet, for a specific environment interaction model, from a facet model.*
- file [radiation\\_base\\_facet.hh](#)  
*Individual facets for use with radiation environment interaction models.*
- file [radiation\\_default\\_surface.hh](#)  
*Individual facets for use with radiation environment interaction models.*
- file [radiation\\_facet.hh](#)  
*Individual facets for use with radiation environment interaction models.*
- file [radiation\\_messages.hh](#)  
*Define the class RadiationMessages, the class that specifies the message IDs used in the Radiation model.*
- file [radiation\\_params.hh](#)  
*A virtual base class for radiation facet parameters, used to create interaction facets for radiation in the Interaction-SurfaceFactorys.*
- file [radiation\\_pressure.hh](#)  
*Radiation pressure top-level definition.*
- file [radiation\\_source.hh](#)  
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- file [flat\\_plate\\_radiation\\_facet.cc](#)  
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- file [flat\\_plate\\_radiation\\_factory.cc](#)  
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- file [radiation\\_base\\_facet.cc](#)  
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- file [radiation\\_facet.cc](#)  
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- file [radiation\\_messages.cc](#)  
*Implement the class RadiationMessages.*
- file [radiation\\_params.cc](#)  
*A virtual base class for radiation facet parameters, used to create interaction facets for radiation in the Interaction-SurfaceFactorys.*
- file [radiation\\_pressure.cc](#)  
*Calculation of force and torque due to radiation pressure.*
- file [radiation\\_pressure\\_\\_default\\_surface.cc](#)  
*Calculation of force and torque due to radiation pressure.*
- file [radiation\\_pressure\\_\\_surface\\_model.cc](#)  
*Calculation of force and torque due to radiation pressure.*
- file [radiation\\_source.cc](#)

*Definition of methods associated with Primary Sources.*

- file [radiation\\_surface.cc](#)

*Vehicle surface model for Radiation Pressure model.*

- file [radiation\\_surface\\_factory.cc](#)

*Factory that creates an interaction surface, for a specific environment interaction model, from a surface model.*

- file [radiation\\_third\\_body.cc](#)

*Provides the functionality associated with RadiationThirdBodys.*

## Namespaces

- [jeod](#)

*Namespace jeod.*

## Macros

- `#define PATH "interactions/radiation_pressure/"`

### 6.3.1 Detailed Description

### 6.3.2 Macro Definition Documentation

#### 6.3.2.1 `#define PATH "interactions/radiation_pressure/"`

Definition at line 38 of file radiation\_messages.cc.

## Chapter 7

# Namespace Documentation

### 7.1 jeod Namespace Reference

Namespace jeod.

#### Data Structures

- class [FlatPlateRadiationFacet](#)  
*A flat plate facet to be used for radiation interaction.*
- class [FlatPlateRadiationFactory](#)  
*The factory for building flat plate radiation facets.*
- class [RadiationBaseFacet](#)  
*Generic type of facet for radiation pressure.*
- class [RadiationDefaultSurface](#)  
*The default spherical surface for radiation pressure.*
- class [RadiationFacet](#)  
*Generic type of facet for radiation pressure.*
- class [RadiationMessages](#)  
*Provides error messages.*
- class [RadiationParams](#)  
*Provides a parameter list to each facet, based on the facet material properties.*
- class [RadiationPressure](#)  
*Radiation pressure top-level definition.*
- class [RadiationSource](#)  
*Provides information on the source of the incident radiation.*
- class [RadiationSurface](#)  
*The surface of the vehicle that interacts with the incident flux.*
- class [RadiationSurfaceFactory](#)  
*The factory for creating Radiation Surfaces.*
- class [RadiationThirdBody](#)  
*Provide information on bodies that may cause shadowing or reflected illumination.*

#### 7.1.1 Detailed Description

Namespace jeod.



## Chapter 8

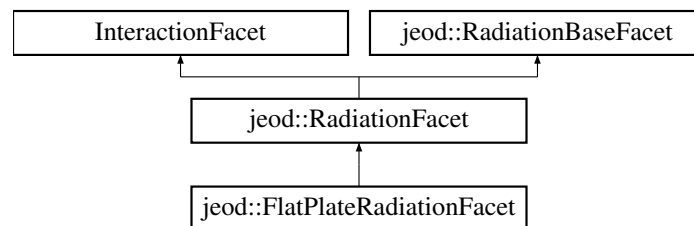
# Data Structure Documentation

### 8.1 jeod::FlatPlateRadiationFacet Class Reference

A flat plate facet to be used for radiation interaction.

```
#include <flat_plate_radiation_facet.hh>
```

Inheritance diagram for jeod::FlatPlateRadiationFacet:



#### Public Member Functions

- `FlatPlateRadiationFacet ()`  
*Construct a `FlatPlateRadiationFacet`.*
- `~FlatPlateRadiationFacet ()` override  
*Destructor for `FlatPlateRadiationFacet`.*
- void `incident_radiation` (const double flux\_mag, const double flux\_struct\_hat[3], const bool calculate\_forces) override  
*Calculation of force and torque due to radiation pressure.*
- void `initialize_geom` (double center\_grav[3]) override  
*Initializes the Facet for use in the model.*
- void `define_facet` (FlatPlate \*flat\_plate)  
*Defines the facet data values.*
- void `radiation_pressure` (void) override  
*Calculates the radiative emission force, accumulated force, and torque acting on a facet.*

#### Data Fields

- double \* `normal`  
*Unit vector normal to the plate surface, pointing outward (structural frame).*
- double `incident_flux_hat` [3]  
*Temporary value.*

## Private Member Functions

- [FlatPlateRadiationFacet](#) & `operator=` (const [FlatPlateRadiationFacet](#) &rhs)
- [FlatPlateRadiationFacet](#) (const [FlatPlateRadiationFacet](#) &rhs)

## Private Attributes

- double [sin\\_theta](#)  
*Theta is the angle between the plate and the radiation vector.*

## Friends

- class [InputProcessor](#)
- void `init_attrjeod__FlatPlateRadiationFacet` ()

## Additional Inherited Members

### 8.1.1 Detailed Description

A flat plate facet to be used for radiation interaction.  
Definition at line 86 of file `flat_plate_radiation_facet.hh`.

### 8.1.2 Constructor & Destructor Documentation

#### 8.1.2.1 `jeod::FlatPlateRadiationFacet::FlatPlateRadiationFacet ( void )`

Construct a [FlatPlateRadiationFacet](#).  
Definition at line 55 of file `flat_plate_radiation_facet.cc`.

#### 8.1.2.2 `jeod::FlatPlateRadiationFacet::~~FlatPlateRadiationFacet ( void )` `[override]`

Destructor for [FlatPlateRadiationFacet](#).  
Definition at line 218 of file `flat_plate_radiation_facet.cc`.

#### 8.1.2.3 `jeod::FlatPlateRadiationFacet::FlatPlateRadiationFacet ( const FlatPlateRadiationFacet & rhs )` `[private]`

### 8.1.3 Member Function Documentation

#### 8.1.3.1 `void jeod::FlatPlateRadiationFacet::define_facet ( FlatPlate * flat_plate )`

Defines the facet data values.

##### Parameters

<code>in</code>	<code>flat_plate</code>	pointer to the flat plate object
-----------------	-------------------------	----------------------------------

Definition at line 70 of file `flat_plate_radiation_facet.cc`.  
References `jeod::RadiationFacet::center_pressure`, and `normal`.  
Referenced by `jeod::FlatPlateRadiationFactory::create_facet()`.

**8.1.3.2** `void jeod::FlatPlateRadiationFacet::incident_radiation ( const double flux_mag, const double flux_struct_hat[3], const bool calculate_forces ) [override],[virtual]`

Calculation of force and torque due to radiation pressure.

#### Assumptions and Limitations

- Only called when `flux_mag > 0`

#### Parameters

in	<i>flux_mag</i>	incident flux (per unit area) Units: N/m
in	<i>flux_struct_hat</i>	the flux unit vector in structural frame
in	<i>calculate_forces</i>	on/off flag for whether to calculate forces.

Implements [jeod::RadiationBaseFacet](#).

Definition at line 114 of file `flat_plate_radiation_facet.cc`.

References `jeod::RadiationBaseFacet::albedo`, `jeod::RadiationBaseFacet::areaxflux`, `jeod::RadiationBaseFacet::areaxflux_e`, `jeod::RadiationBaseFacet::cx_area`, `jeod::RadiationBaseFacet::diffuse`, `jeod::RadiationBaseFacet::F_absorption`, `jeod::RadiationBaseFacet::F_diffuse`, `jeod::RadiationBaseFacet::F_specular`, `normal`, `sin_theta`, `jeod::RadiationBaseFacet::speed_of_light`, `jeod::RadiationBaseFacet::thermal`, and `jeod::RadiationFacet::two-thirds`.

**8.1.3.3** `void jeod::FlatPlateRadiationFacet::initialize_geom ( double center_grav[3] ) [override],[virtual]`

Initializes the Facet for use in the model.

#### Parameters

in	<i>center_grav</i>	center of gravity position Units: M
----	--------------------	--

Implements [jeod::RadiationFacet](#).

Definition at line 92 of file `flat_plate_radiation_facet.cc`.

References `jeod::RadiationFacet::center_pressure`, `jeod::RadiationFacet::crot_to_cp`, `jeod::RadiationFacet::initialize()`, and `jeod::RadiationBaseFacet::thermal`.

**8.1.3.4** `FlatPlateRadiationFacet& jeod::FlatPlateRadiationFacet::operator= ( const FlatPlateRadiationFacet & rhs ) [private]`

**8.1.3.5** `void jeod::FlatPlateRadiationFacet::radiation_pressure ( void ) [override],[virtual]`

Calculates the radiative emission force, accumulated force, and torque acting on a facet.

Implements [jeod::RadiationFacet](#).

Definition at line 177 of file `flat_plate_radiation_facet.cc`.

References `jeod::RadiationFacet::crot_to_cp`, `jeod::RadiationBaseFacet::F_absorption`, `jeod::RadiationBaseFacet::F_diffuse`, `jeod::RadiationBaseFacet::F_emission`, `jeod::RadiationBaseFacet::F_specular`, `normal`, `jeod::RadiationBaseFacet::speed_of_light`, `jeod::RadiationBaseFacet::thermal`, `jeod::RadiationFacet::two-thirds`, and `jeod::RadiationMessages::unknown_numerical_error`.

## 8.1.4 Friends And Related Function Documentation

**8.1.4.1** `void init_attrjeod__FlatPlateRadiationFacet ( ) [friend]`

#### 8.1.4.2 friend class InputProcessor [friend]

Definition at line 88 of file flat\_plate\_radiation\_facet.hh.

### 8.1.5 Field Documentation

#### 8.1.5.1 double jeod::FlatPlateRadiationFacet::incident\_flux\_hat[3]

Temporary value.

trick\_units(-)

Definition at line 104 of file flat\_plate\_radiation\_facet.hh.

#### 8.1.5.2 double\* jeod::FlatPlateRadiationFacet::normal

Unit vector normal to the plate surface, pointing outward (structural frame).

once the radiation surface is initialized, it points to the normal found in FlatPlate::trick\_units(-)

Definition at line 99 of file flat\_plate\_radiation\_facet.hh.

Referenced by define\_facet(), incident\_radiation(), and radiation\_pressure().

#### 8.1.5.3 double jeod::FlatPlateRadiationFacet::sin\_theta [private]

Theta is the angle between the plate and the radiation vector.

trick\_units(-)

Definition at line 110 of file flat\_plate\_radiation\_facet.hh.

Referenced by incident\_radiation().

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

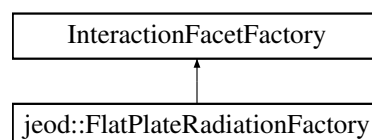
- [flat\\_plate\\_radiation\\_facet.hh](#)
- [flat\\_plate\\_radiation\\_facet.cc](#)

## 8.2 jeod::FlatPlateRadiationFactory Class Reference

The factory for building flat plate radiation facets.

```
#include <flat_plate_radiation_factory.hh>
```

Inheritance diagram for jeod::FlatPlateRadiationFactory:



### Public Member Functions

- [FlatPlateRadiationFactory \(\)](#)  
*Constructor for FlatPlateRadiationFactory.*
- [~FlatPlateRadiationFactory \(\)](#) override



Destructor for [FlatPlateRadiationFactory](#).

- InteractionFacet \* [create\\_facet](#) (Facet \*facet, FacetParams \*params) override

Records the data for the Flat Plate Radiation Facet.

- bool [is\\_correct\\_factory](#) (Facet \*facet) override

Tests to ensure that the factory can function on the facet as intended.

## Private Member Functions

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

## Friends

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

### 8.2.1 Detailed Description

The factory for building flat plate radiation facets.

Definition at line 85 of file flat\_plate\_radiation\_factory.hh.

### 8.2.2 Constructor & Destructor Documentation

#### 8.2.2.1 jeod::FlatPlateRadiationFactory::FlatPlateRadiationFactory ( void )

Constructor for [FlatPlateRadiationFactory](#).

Definition at line 63 of file flat\_plate\_radiation\_factory.cc.

#### 8.2.2.2 jeod::FlatPlateRadiationFactory::~~FlatPlateRadiationFactory ( void ) [override]

Destructor for [FlatPlateRadiationFactory](#).

Definition at line 154 of file flat\_plate\_radiation\_factory.cc.

#### 8.2.2.3 jeod::FlatPlateRadiationFactory::FlatPlateRadiationFactory ( const FlatPlateRadiationFactory & rhs ) [private]

### 8.2.3 Member Function Documentation

#### 8.2.3.1 InteractionFacet \* jeod::FlatPlateRadiationFactory::create\_facet ( Facet \* facet, FacetParams \* params ) [override]

Records the data for the Flat Plate Radiation Facet.

#### Returns

pointer to the interaction facet that this function creates.

## Parameters

in	<i>facet</i>	pointer to the facet
in	<i>params</i>	pointer to the set of parameters for the facet.

Definition at line 77 of file flat\_plate\_radiation\_factory.cc.

References jeod::FlatPlateRadiationFacet::define\_facet(), and jeod::RadiationMessages::invalid\_setup\_error.

### 8.2.3.2 bool jeod::FlatPlateRadiationFactory::is\_correct\_factory ( Facet \* *facet* ) [override]

Tests to ensure that the factory can function on the facet as intended.

## Returns

Boolean, is this the correct factory?

## Parameters

in	<i>facet</i>	pointer to the facet being manipulated by the factory
----	--------------	---

Definition at line 136 of file flat\_plate\_radiation\_factory.cc.

### 8.2.3.3 FlatPlateRadiationFactory& jeod::FlatPlateRadiationFactory::operator= ( const FlatPlateRadiationFactory & *rhs* ) [private]

## 8.2.4 Friends And Related Function Documentation

### 8.2.4.1 void init\_attrjeod\_\_FlatPlateRadiationFactory ( ) [friend]

### 8.2.4.2 friend class InputProcessor [friend]

Definition at line 87 of file flat\_plate\_radiation\_factory.hh.

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

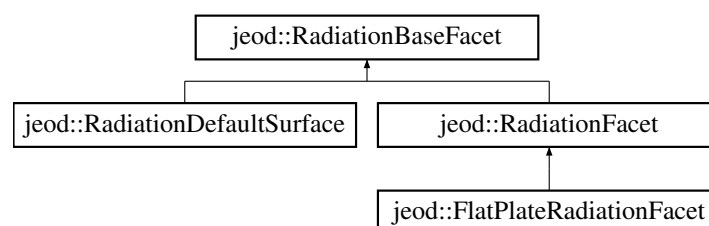
- [flat\\_plate\\_radiation\\_factory.hh](#)
- [flat\\_plate\\_radiation\\_factory.cc](#)

## 8.3 jeod::RadiationBaseFacet Class Reference

Generic type of facet for radiation pressure.

```
#include <radiation_base_facet.hh>
```

Inheritance diagram for jeod::RadiationBaseFacet:



## Public Member Functions

- [RadiationBaseFacet](#) ()  
*Construct a [RadiationBaseFacet](#).*
- virtual [~RadiationBaseFacet](#) ()  
*Destructor for [RadiationBaseFacet](#).*
- virtual void [initialize](#) (void)  
*initializes the base surface*
- virtual void [interact\\_with\\_third\\_body](#) ([RadiationThirdBody](#) \*third\_body, const bool calc\_forces)  
*Calculation of force, torques and irradiance due to ThirdBody flux.*
- virtual void [initialize\\_runtime\\_values](#) (void)  
*To initialize the values during each update run.*
- virtual void [incident\\_radiation](#) (const double flux\_mag, const double flux\_hat[3], const bool calc\_forc)=0  
*Calculates the effect on the facet of the incident radiation.*

## Data Fields

- double [albedo](#)  
*Usable value of albedo, set to either albedo\_IR or albedo\_vis, depending on situation.*
- double [albedo\\_vis](#)  
*Fraction of incident visible radiation that is immediately reflected.*
- double [albedo\\_IR](#)  
*Fraction of incident IR radiation that is immediately reflected.*
- double [diffuse](#)  
*Fraction of reflected radiation that is reflected diffusely (balance reflected specularly)*
- ThermalFacetRider [thermal](#)  
*thermal characteristics of the facet.*
- double [cx\\_area](#)  
*cross-sectional area projected perpendicular to the radiation vector.*
- double [areaxflux](#)  
*product of momentum flux and cross-sectional area (cx\_area).*
- double [areaxflux\\_e](#)  
*product of energy flux and cross-sectional area*
- double [F\\_absorption](#) [3]  
*Force due to photon absorption from ONLY ONE source.*
- double [F\\_specular](#) [3]  
*Force due to photon specular reflection from ONLY ONE source.*
- double [F\\_diffuse](#) [3]  
*Force due to photon diffuse reflection from ONLY ONE source.*
- double [F\\_emission](#) [3]  
*Force due to photon (thermal) emission.*

## Static Protected Attributes

- static const double [speed\\_of\\_light](#) = 299792458.0  
*Speed of light in vacuum.*

## Private Member Functions

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

## Friends

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

### 8.3.1 Detailed Description

Generic type of facet for radiation pressure.

Definition at line 86 of file `radiation_base_facet.hh`.

### 8.3.2 Constructor & Destructor Documentation

#### 8.3.2.1 `jeod::RadiationBaseFacet::RadiationBaseFacet ( void )`

Construct a [RadiationBaseFacet](#).

Definition at line 56 of file `radiation_base_facet.cc`.

#### 8.3.2.2 `jeod::RadiationBaseFacet::~~RadiationBaseFacet ( void ) [virtual]`

Destructor for [RadiationBaseFacet](#).

Definition at line 156 of file `radiation_base_facet.cc`.

#### 8.3.2.3 `jeod::RadiationBaseFacet::RadiationBaseFacet ( const RadiationBaseFacet & rhs ) [private]`

### 8.3.3 Member Function Documentation

#### 8.3.3.1 `virtual void jeod::RadiationBaseFacet::incident_radiation ( const double flux_mag, const double flux_hat[3], const bool calc_forc ) [pure virtual]`

Calculates the effect on the facet of the incident radiation.

Parameters

in	<i>flux_mag</i>	Magnitude of the incident flux
in	<i>flux_hat</i>	unit vector associated with the incident flux vector
in	<i>calc_forc</i>	true/false, do forces get calculated

Implemented in [jeod::RadiationDefaultSurface](#), and [jeod::FlatPlateRadiationFacet](#).

Referenced by `jeod::RadiationSurface::incident_radiation()`.

#### 8.3.3.2 `void jeod::RadiationBaseFacet::initialize ( void ) [virtual]`

initializes the base surface

Reimplemented in [jeod::RadiationDefaultSurface](#), and [jeod::RadiationFacet](#).

Definition at line 76 of file `radiation_base_facet.cc`.

References `albedo`, `albedo_IR`, `albedo_vis`, and `jeod::RadiationMessages::invalid_setup_error`.

Referenced by `jeod::RadiationFacet::initialize()`, and `jeod::RadiationDefaultSurface::initialize()`.

#### 8.3.3.3 `void jeod::RadiationBaseFacet::initialize_runtime_values ( void ) [virtual]`

To initialize the values during each update run.

Definition at line 143 of file radiation\_base\_facet.cc.

References F\_absorption, F\_diffuse, F\_specular, and thermal.

Referenced by jeod::RadiationSurface::initialize\_runtime\_values(), and jeod::RadiationPressure::update\_default\_surface().

**8.3.3.4** void jeod::RadiationBaseFacet::interact\_with\_third\_body ( RadiationThirdBody \* *third\_body\_ptr*, const bool *calculate\_forces* ) [virtual]

Calculation of force, torques and irradiance due to ThirdBody flux.

Parameters

in, out	<i>third_body_ptr</i>	Third body that emits radiation
in	<i>calculate_forces</i>	Calculate forces on this facet if true.

Definition at line 121 of file radiation\_base\_facet.cc.

References jeod::RadiationThirdBody::accumulate\_rad\_flux(), jeod::RadiationThirdBody::accumulate\_refl\_flux(), albedo, albedo\_IR, and albedo\_vis.

Referenced by jeod::RadiationSurface::interact\_with\_third\_body(), and jeod::RadiationPressure::update\_default\_surface().

**8.3.3.5** RadiationBaseFacet& jeod::RadiationBaseFacet::operator= ( const RadiationBaseFacet & *rhs* ) [private]

## 8.3.4 Friends And Related Function Documentation

**8.3.4.1** void init\_attrjeod\_\_RadiationBaseFacet ( ) [friend]

**8.3.4.2** friend class InputProcessor [friend]

Definition at line 88 of file radiation\_base\_facet.hh.

## 8.3.5 Field Documentation

**8.3.5.1** double jeod::RadiationBaseFacet::albedo

Usable value of albedo, set to either albedo\_IR or albedo\_vis, depending on situation.

trick\_units(-)

Definition at line 98 of file radiation\_base\_facet.hh.

Referenced by jeod::RadiationFacet::define\_facet\_core(), jeod::FlatPlateRadiationFacet::incident\_radiation(), jeod::RadiationDefaultSurface::incident\_radiation(), jeod::RadiationFacet::initialize(), jeod::RadiationDefaultSurface::initialize(), initialize(), interact\_with\_third\_body(), and jeod::RadiationDefaultSurface::RadiationDefaultSurface().

**8.3.5.2** double jeod::RadiationBaseFacet::albedo\_IR

Fraction of incident IR radiation that is immediately reflected.

trick\_units(-)

Definition at line 108 of file radiation\_base\_facet.hh.

Referenced by jeod::RadiationFacet::initialize(), initialize(), and interact\_with\_third\_body().

**8.3.5.3 double jeod::RadiationBaseFacet::albedo\_vis**

Fraction of incident visible radiation that is immediately reflected.

trick\_units(-)

Definition at line 103 of file radiation\_base\_facet.hh.

Referenced by jeod::RadiationFacet::initialize(), initialize(), and interact\_with\_third\_body().

**8.3.5.4 double jeod::RadiationBaseFacet::areaxflux**

product of momentum flux and cross-sectional area (cx\_area).

Highly variable.trick\_units(-)

Definition at line 138 of file radiation\_base\_facet.hh.

Referenced by jeod::FlatPlateRadiationFacet::incident\_radiation(), jeod::RadiationDefaultSurface::incident\_radiation(), and jeod::RadiationDefaultSurface::RadiationDefaultSurface().

**8.3.5.5 double jeod::RadiationBaseFacet::areaxflux\_e**

product of energy flux and cross-sectional area

trick\_units(-)

Definition at line 143 of file radiation\_base\_facet.hh.

Referenced by jeod::FlatPlateRadiationFacet::incident\_radiation(), jeod::RadiationDefaultSurface::incident\_radiation(), and jeod::RadiationDefaultSurface::RadiationDefaultSurface().

**8.3.5.6 double jeod::RadiationBaseFacet::cx\_area**

cross-sectional area projected perpendicular to the radiation vector.

For facets that have an orientation, this is intended to be a variable value, dependent upon the orientation. For spherical surfaces, this can be set at initialization.trick\_units(m2)

Definition at line 129 of file radiation\_base\_facet.hh.

Referenced by jeod::FlatPlateRadiationFacet::incident\_radiation(), jeod::RadiationDefaultSurface::incident\_radiation(), jeod::RadiationDefaultSurface::initialize(), and jeod::RadiationDefaultSurface::RadiationDefaultSurface().

**8.3.5.7 double jeod::RadiationBaseFacet::diffuse**

Fraction of reflected radiation that is reflected diffusely (balance reflected specularly)

trick\_units(-)

Definition at line 114 of file radiation\_base\_facet.hh.

Referenced by jeod::RadiationFacet::define\_facet\_core(), jeod::FlatPlateRadiationFacet::incident\_radiation(), jeod::RadiationDefaultSurface::incident\_radiation(), jeod::RadiationFacet::initialize(), jeod::RadiationDefaultSurface::initialize(), and jeod::RadiationDefaultSurface::RadiationDefaultSurface().

**8.3.5.8 double jeod::RadiationBaseFacet::F\_absorption[3]**

Force due to photon absorption from ONLY ONE source.

trick\_units(-)

Definition at line 148 of file radiation\_base\_facet.hh.

Referenced by jeod::FlatPlateRadiationFacet::incident\_radiation(), jeod::RadiationDefaultSurface::incident\_radiation(), initialize\_runtime\_values(), jeod::FlatPlateRadiationFacet::radiation\_pressure(), jeod::RadiationDefaultSurface::RadiationDefaultSurface(), and jeod::RadiationPressure::update\_default\_surface().

#### 8.3.5.9 double jeod::RadiationBaseFacet::F\_diffuse[3]

Force due to photon diffuse reflection from ONLY ONE source.

trick\_units(–)

Definition at line 158 of file radiation\_base\_facet.hh.

Referenced by jeod::FlatPlateRadiationFacet::incident\_radiation(), jeod::RadiationDefaultSurface::incident\_radiation(), initialize\_runtime\_values(), jeod::FlatPlateRadiationFacet::radiation\_pressure(), jeod::RadiationDefaultSurface::RadiationDefaultSurface(), and jeod::RadiationPressure::update\_default\_surface().

#### 8.3.5.10 double jeod::RadiationBaseFacet::F\_emission[3]

Force due to photon (thermal) emission.

trick\_units(–)

Definition at line 163 of file radiation\_base\_facet.hh.

Referenced by jeod::FlatPlateRadiationFacet::radiation\_pressure(), and jeod::RadiationDefaultSurface::RadiationDefaultSurface().

#### 8.3.5.11 double jeod::RadiationBaseFacet::F\_specular[3]

Force due to photon specular reflection from ONLY ONE source.

trick\_units(–)

Definition at line 153 of file radiation\_base\_facet.hh.

Referenced by jeod::FlatPlateRadiationFacet::incident\_radiation(), jeod::RadiationDefaultSurface::incident\_radiation(), initialize\_runtime\_values(), jeod::FlatPlateRadiationFacet::radiation\_pressure(), jeod::RadiationDefaultSurface::RadiationDefaultSurface(), and jeod::RadiationPressure::update\_default\_surface().

#### 8.3.5.12 const double jeod::RadiationBaseFacet::speed\_of\_light = 299792458.0 [static], [protected]

Speed of light in vacuum.

trick\_io(\*o) trick\_units(m/s)

Definition at line 171 of file radiation\_base\_facet.hh.

Referenced by jeod::FlatPlateRadiationFacet::incident\_radiation(), jeod::RadiationDefaultSurface::incident\_radiation(), and jeod::FlatPlateRadiationFacet::radiation\_pressure().

#### 8.3.5.13 ThermalFacetRider jeod::RadiationBaseFacet::thermal

thermal characteristics of the facet.

trick\_units(–)

Definition at line 119 of file radiation\_base\_facet.hh.

Referenced by jeod::RadiationSurface::accumulate\_thermal\_sources(), jeod::RadiationDefaultSurface::add\_thermal\_integrator\_to(), jeod::RadiationFacet::define\_facet\_core(), jeod::RadiationSurface::equalize\_absorption\_emission(), jeod::RadiationFacet::get\_thermal\_integrator(), jeod::FlatPlateRadiationFacet::incident\_radiation(),

jeod::RadiationDefaultSurface::incident\_radiation(), jeod::RadiationFacet::initialize(), jeod::RadiationSurface::initialize(), jeod::RadiationDefaultSurface::initialize(), jeod::FlatPlateRadiationFacet::initialize\_geom(), initialize\_runtime\_values(), jeod::FlatPlateRadiationFacet::radiation\_pressure(), jeod::RadiationSurface::thermal\_integrator(), and jeod::RadiationDefaultSurface::thermal\_update().

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

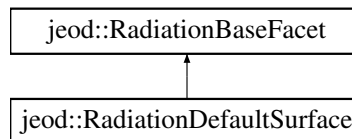
- [radiation\\_base\\_facet.hh](#)
- [radiation\\_base\\_facet.cc](#)

## 8.4 jeod::RadiationDefaultSurface Class Reference

The default spherical surface for radiation pressure.

```
#include <radiation_default_surface.hh>
```

Inheritance diagram for jeod::RadiationDefaultSurface:



### Public Member Functions

- [RadiationDefaultSurface](#) ()  
*Constructor for [RadiationDefaultSurface](#).*
- [~RadiationDefaultSurface](#) () override  
*Destructor for [RadiationDefaultSurface](#).*
- void [initialize](#) (void) override  
*initializes the default surface*
- void [incident\\_radiation](#) (const double flux\_mag, const double flux\_struc\_hat[3], const bool calculate\_forces) override  
*Calculation of force and torque due to radiation pressure.*
- void [thermal\\_update](#) (void)  
*Test for necessity of maintaining thermal updates, and performs them as necessary.*
- void [add\\_thermal\\_integrator\\_to](#) (DynBody \*dyn\_body)  
*Adds the thermal integrator of this surface to the integration group of the DynBody.*
- void [set\\_name](#) (std::string name\_in)  
*Setter for the name.*

### Data Fields

- double [rad\\_coeff](#)  
*The radiation-equivalent of a drag coefficient.*
- double [temperature](#)  
*The value of the surface kinetic temperature.*
- std::string [name](#)  
*The name of the surface.*
- double [surface\\_area](#)  
*surface area of the default sphere.*



## Private Member Functions

- [RadiationDefaultSurface](#) & `operator=` (const [RadiationDefaultSurface](#) &rhs)
- [RadiationDefaultSurface](#) (const [RadiationDefaultSurface](#) &rhs)

## Friends

- class [InputProcessor](#)
- void `init_attrjeod__RadiationDefaultSurface` ()

## Additional Inherited Members

### 8.4.1 Detailed Description

The default spherical surface for radiation pressure.

Definition at line 89 of file `radiation_default_surface.hh`.

### 8.4.2 Constructor & Destructor Documentation

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

Constructor for [RadiationDefaultSurface](#).

Definition at line 65 of file `radiation_default_surface.cc`.

References `jeod::RadiationBaseFacet::albedo`, `jeod::RadiationBaseFacet::areaxflux`, `jeod::RadiationBaseFacet::areaxflux_e`, `jeod::RadiationBaseFacet::cx_area`, `jeod::RadiationBaseFacet::diffuse`, `jeod::RadiationBaseFacet::F_absorption`, `jeod::RadiationBaseFacet::F_diffuse`, `jeod::RadiationBaseFacet::F_emission`, `jeod::RadiationBaseFacet::F_specular`, `rad_coeff`, `surface_area`, and `temperature`.

#### 8.4.2.2 `jeod::RadiationDefaultSurface::~~RadiationDefaultSurface ( void )` `[override]`

Destructor for [RadiationDefaultSurface](#).

Definition at line 299 of file `radiation_default_surface.cc`.

#### 8.4.2.3 `jeod::RadiationDefaultSurface::RadiationDefaultSurface ( const RadiationDefaultSurface & rhs )` `[private]`

### 8.4.3 Member Function Documentation

#### 8.4.3.1 `void jeod::RadiationDefaultSurface::add_thermal_integrator_to ( DynBody * dyn_body )`

Adds the thermal integrator of this surface to the integration group of the DynBody.

Parameters

<code>in, out</code>	<code>dyn_body</code>	Body associated with this thermal object.
----------------------	-----------------------	---

Definition at line 289 of file `radiation_default_surface.cc`.

References `jeod::RadiationBaseFacet::thermal`.

#### 8.4.3.2 `void jeod::RadiationDefaultSurface::incident_radiation ( const double flux_mag, const double flux_struct_hat[3], const bool calculate_forces )` `[override]`, `[virtual]`

Calculation of force and torque due to radiation pressure.

### Assumptions and Limitations

- Assumes that flux magnitude is positive.
- Will only be called if flux magnitude is positive.
- Assumes spherical surface.

### Parameters

in	<i>flux_mag</i>	the magnitude of the incident flux
in	<i>flux_struc_hat</i>	the unit vector in structural frame for the flux vector.
in	<i>calculate_forces</i>	boolean indicating whether to calculate forces.

Implements [jeod::RadiationBaseFacet](#).

Definition at line 218 of file radiation\_default\_surface.cc.

References [jeod::RadiationBaseFacet::albedo](#), [jeod::RadiationBaseFacet::areaxflux](#), [jeod::RadiationBaseFacet::areaxflux\\_e](#), [jeod::RadiationBaseFacet::cx\\_area](#), [jeod::RadiationBaseFacet::diffuse](#), [jeod::RadiationBaseFacet::F\\_absorption](#), [jeod::RadiationBaseFacet::F\\_diffuse](#), [jeod::RadiationBaseFacet::F\\_specular](#), [jeod::RadiationBaseFacet::speed\\_of\\_light](#), and [jeod::RadiationBaseFacet::thermal](#).

Referenced by [jeod::RadiationPressure::update\\_default\\_surface\(\)](#).

#### 8.4.3.3 void jeod::RadiationDefaultSurface::initialize ( void ) [override],[virtual]

initializes the default surface

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

Definition at line 89 of file radiation\_default\_surface.cc.

References [jeod::RadiationBaseFacet::albedo](#), [jeod::RadiationBaseFacet::cx\\_area](#), [jeod::RadiationBaseFacet::diffuse](#), [jeod::RadiationBaseFacet::initialize\(\)](#), [jeod::RadiationMessages::invalid\\_setup\\_error](#), [jeod::RadiationMessages::operational\\_setup\\_error](#), [rad\\_coeff](#), [surface\\_area](#), [temperature](#), and [jeod::RadiationBaseFacet::thermal](#).

Referenced by [jeod::RadiationPressure::initialize\(\)](#).

#### 8.4.3.4 RadiationDefaultSurface& jeod::RadiationDefaultSurface::operator= ( const RadiationDefaultSurface & rhs ) [private]

#### 8.4.3.5 void jeod::RadiationDefaultSurface::set\_name ( std::string name\_in ) [inline]

Setter for the name.

Definition at line 160 of file radiation\_default\_surface.hh.

#### 8.4.3.6 void jeod::RadiationDefaultSurface::thermal\_update ( void )

Test for necessity of maintaining thermal updates, and performs them as necessary.

Definition at line 270 of file radiation\_default\_surface.cc.

References [temperature](#), and [jeod::RadiationBaseFacet::thermal](#).

Referenced by [jeod::RadiationPressure::update\\_default\\_surface\(\)](#).

## 8.4.4 Friends And Related Function Documentation

#### 8.4.4.1 void init\_attrjeod\_\_RadiationDefaultSurface ( ) [friend]

#### 8.4.4.2 friend class InputProcessor [friend]

Definition at line 91 of file radiation\_default\_surface.hh.

### 8.4.5 Field Documentation

#### 8.4.5.1 std::string jeod::RadiationDefaultSurface::name

The name of the surface.

This is optional.trick\_units(-)

Definition at line 119 of file radiation\_default\_surface.hh.

#### 8.4.5.2 double jeod::RadiationDefaultSurface::rad\_coeff

The radiation-equivalent of a drag coefficient.

It is the value by which the area must be multiplied in order to generate the same force if the reflecting surface were considered a perfectly absorbing surface. For a sphere, this has a value between 1.0 (perfectly absorbing, or perfect specular reflection) to 1.4444 (all diffuse reflection). Specify either: rad\_coeff OR (albedo AND diffuse). NOTE 1 - this value is used at initialization only; changes to its value mid-simulation cannot be effected. NOTE 2 - the values albedo and diffuse are inherited from RadiationBaseFacet.trick\_units(-)

Definition at line 109 of file radiation\_default\_surface.hh.

Referenced by initialize(), and RadiationDefaultSurface().

#### 8.4.5.3 double jeod::RadiationDefaultSurface::surface\_area

surface area of the default sphere.

trick\_units(m2)

Definition at line 129 of file radiation\_default\_surface.hh.

Referenced by initialize(), and RadiationDefaultSurface().

#### 8.4.5.4 double jeod::RadiationDefaultSurface::temperature

The value of the surface kinetic temperature.

trick\_units(K)

Definition at line 114 of file radiation\_default\_surface.hh.

Referenced by initialize(), RadiationDefaultSurface(), and thermal\_update().

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

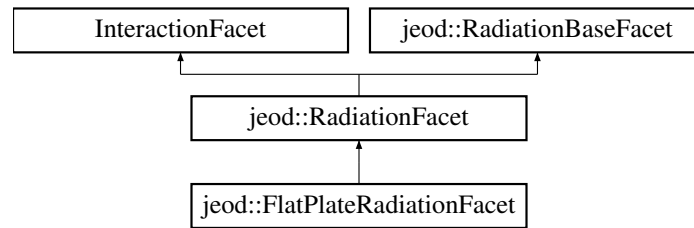
- [radiation\\_default\\_surface.hh](#)
- [radiation\\_default\\_surface.cc](#)

## 8.5 jeod::RadiationFacet Class Reference

Generic type of facet for radiation pressure.

```
#include <radiation_facet.hh>
```

Inheritance diagram for jeod::RadiationFacet:



## Public Member Functions

- [RadiationFacet](#) ()  
*Constructor for Radiationfacet.*
- [~RadiationFacet](#) () override  
*Destructor for [RadiationFacet](#).*
- virtual void [radiation\\_pressure](#) ()=0  
*Calculates the effect of radiation pressure on the facet.*
- virtual void [initialize\\_geom](#) (double cg[3])=0  
*Initialize the facet geometry.*
- void [initialize](#) () override  
*Run sanity checks on input variables.*
- void [define\\_facet\\_core](#) (Facet \*facet, const ThermalFacetRider &facet\_thermal, [RadiationParams](#) \*params)  
*Defines the inherent facet values.*
- ThermalIntegrableObject & [get\\_thermal\\_integrator](#) ()  
*Get the integrator for thermal characteristics.*

## Data Fields

- double [crot\\_to\\_cp](#) [3]  
*position of center of pressure w.r.t.*
- double \* [center\\_pressure](#)  
*Center of pressure (in structural frame).*

## Static Protected Attributes

- static const double [two\\_thirds](#) = 2.0 / 3.0  
*quite literally, 2/3.*

## Private Member Functions

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

## Friends

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

### 8.5.1 Detailed Description

Generic type of facet for radiation pressure.

Definition at line 87 of file radiation\_facet.hh.

### 8.5.2 Constructor & Destructor Documentation

#### 8.5.2.1 jeod::RadiationFacet::RadiationFacet ( void )

Constructor for Radiationfacet.

Definition at line 59 of file radiation\_facet.cc.

References center\_pressure, and crot\_to\_cp.

#### 8.5.2.2 jeod::RadiationFacet::~~RadiationFacet ( void ) [override]

Destructor for [RadiationFacet](#).

Definition at line 121 of file radiation\_facet.cc.

#### 8.5.2.3 jeod::RadiationFacet::RadiationFacet ( const RadiationFacet & rhs ) [private]

### 8.5.3 Member Function Documentation

#### 8.5.3.1 void jeod::RadiationFacet::define\_facet\_core ( Facet \* facet, const ThermalFacetRider & facet\_thermal, RadiationParams \* params )

Defines the inherent facet values.

Parameters

in	<i>facet</i>	pointer to the facet
in	<i>facet_thermal</i>	reference to the thermal components of the facet.
in	<i>params</i>	pointer to the list of material parameters for the facet.

Definition at line 100 of file radiation\_facet.cc.

References jeod::RadiationParams::albedo, jeod::RadiationBaseFacet::albedo, jeod::RadiationParams::diffuse, jeod::RadiationBaseFacet::diffuse, jeod::RadiationParams::thermal, and jeod::RadiationBaseFacet::thermal.

#### 8.5.3.2 ThermalIntegrableObject& jeod::RadiationFacet::get\_thermal\_integrator ( ) [inline]

Get the integrator for thermal characteristics.

Returns

Integrable object that integrates temperature.

Definition at line 154 of file radiation\_facet.hh.

References jeod::RadiationBaseFacet::thermal.

#### 8.5.3.3 void jeod::RadiationFacet::initialize ( void ) [override],[virtual]

Run sanity checks on input variables.

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

Definition at line 70 of file radiation\_facet.cc.

References `jeod::RadiationBaseFacet::albedo`, `jeod::RadiationBaseFacet::albedo_IR`, `jeod::RadiationBaseFacet::albedo_vis`, `jeod::RadiationBaseFacet::diffuse`, `jeod::RadiationBaseFacet::initialize()`, `jeod::RadiationMessages::invalid_setup_error`, and `jeod::RadiationBaseFacet::thermal`.

Referenced by `jeod::FlatPlateRadiationFacet::initialize_geom()`.

#### 8.5.3.4 `virtual void jeod::RadiationFacet::initialize_geom ( double cg[3] ) [pure virtual]`

Initialize the facet geometry.

Parameters

<code>cg</code>	Center of mass.
-----------------	-----------------

Implemented in `jeod::FlatPlateRadiationFacet`.

Referenced by `jeod::RadiationSurface::initialize()`.

#### 8.5.3.5 `RadiationFacet& jeod::RadiationFacet::operator= ( const RadiationFacet & rhs ) [private]`

#### 8.5.3.6 `virtual void jeod::RadiationFacet::radiation_pressure ( ) [pure virtual]`

Calculates the effect of radiation pressure on the facet.

Implemented in `jeod::FlatPlateRadiationFacet`.

Referenced by `jeod::RadiationSurface::radiation_pressure()`.

### 8.5.4 Friends And Related Function Documentation

#### 8.5.4.1 `void init_attrjeod__RadiationFacet ( ) [friend]`

#### 8.5.4.2 `friend class InputProcessor [friend]`

Definition at line 89 of file radiation\_facet.hh.

### 8.5.5 Field Documentation

#### 8.5.5.1 `double* jeod::RadiationFacet::center_pressure`

Center of pressure (in structural frame).

Potentially variable, depending on the topology of the facet. For a flat plate facet, this just points to the position found in `FlatPlatetrack_units(m)`

Definition at line 108 of file radiation\_facet.hh.

Referenced by `jeod::FlatPlateRadiationFacet::define_facet()`, `jeod::FlatPlateRadiationFacet::initialize_geom()`, and `RadiationFacet()`.

#### 8.5.5.2 `double jeod::RadiationFacet::crot_to_cp[3]`

position of center of pressure w.r.t.

center of rotation (usually center of mass, or center of gravity), expressed in structural reference frame. Potentially variable, depending on the topology of the facet and the configuration of the vehicle. `track_units(m)`

Definition at line 101 of file radiation\_facet.hh.

Referenced by `jeod::FlatPlateRadiationFacet::initialize_geom()`, `jeod::FlatPlateRadiationFacet::radiation_pressure()`, and `RadiationFacet()`.

**8.5.5.3** `const double jeod::RadiationFacet::two_thirds = 2.0 / 3.0` `[static]`, `[protected]`

quite literally, 2/3.

Occurs frequently with diffuse reflection and emission, so it is calculated once. `trick_io(*o) trick_units(-)`

Definition at line 118 of file `radiation_facet.hh`.

Referenced by `jeod::FlatPlateRadiationFacet::incident_radiation()`, and `jeod::FlatPlateRadiationFacet::radiation_pressure()`.

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

- [radiation\\_facet.hh](#)
- [radiation\\_facet.cc](#)

## 8.6 jeod::RadiationMessages Class Reference

Provides error messages.

```
#include <radiation_messages.hh>
```

### Static Public Attributes

- static char const \* [incomplete\\_setup\\_error](#)  
*The setup was not fully defined.*
- static char const \* [invalid\\_setup\\_error](#)  
*The setup is invalid.*
- static char const \* [operational\\_setup\\_error](#)  
*Something internal went wrong in the setup methods without obvious user error.*
- static char const \* [invalid\\_function\\_call](#)  
*A function was called before it was fully implemented.*
- static char const \* [unknown\\_numerical\\_error](#)  
*Something went horribly wrong.*

### Private Member Functions

- [RadiationMessages](#) (void)
- [RadiationMessages](#) (const [RadiationMessages](#) &)
- [RadiationMessages](#) & `operator=` (const [RadiationMessages](#) &)

### Friends

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

### 8.6.1 Detailed Description

Provides error messages.

Definition at line 87 of file `radiation_messages.hh`.

## 8.6.2 Constructor & Destructor Documentation

8.6.2.1 `jeod::RadiationMessages::RadiationMessages ( void ) [private]`

8.6.2.2 `jeod::RadiationMessages::RadiationMessages ( const RadiationMessages & ) [private]`

## 8.6.3 Member Function Documentation

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

## 8.6.4 Friends And Related Function Documentation

8.6.4.1 `void init_attrjeod__RadiationMessages ( ) [friend]`

8.6.4.2 `friend class InputProcessor [friend]`

Definition at line 90 of file radiation\_messages.hh.

## 8.6.5 Field Documentation

8.6.5.1 `char const * jeod::RadiationMessages::incomplete_setup_error [static]`

**Initial value:**

```
=
    "interactions/radiation_pressure/" "incomplete_setup_error"
```

The setup was not fully defined.

trick\_units(-)

Definition at line 99 of file radiation\_messages.hh.

Referenced by `jeod::RadiationPressure::add_third_body()`, and `jeod::RadiationSource::initialize()`.

8.6.5.2 `char const * jeod::RadiationMessages::invalid_function_call [static]`

**Initial value:**

```
=
    "interactions/radiation_pressure/" "invalid_function_call"
```

A function was called before it was fully implemented.

trick\_units(-)

Definition at line 112 of file radiation\_messages.hh.

Referenced by `jeod::RadiationPressure::find_third_body()`, `jeod::RadiationPressure::set_third_body_active()`, and `jeod::RadiationPressure::set_third_body_inactive()`.

8.6.5.3 `char const * jeod::RadiationMessages::invalid_setup_error [static]`

**Initial value:**

```
=
    "interactions/radiation_pressure/" "invalid_setup_error"
```



The setup is invalid.

trick\_units(-)

Definition at line 103 of file radiation\_messages.hh.

Referenced by jeod::RadiationSurfaceFactory::add\_facet\_params(), jeod::RadiationPressure::add\_third\_body(), jeod::RadiationSurface::allocate\_interaction\_facet(), jeod::RadiationThirdBody::calculate\_shadow(), jeod::RadiationThirdBody::convert\_shadow\_from\_int(), jeod::FlatPlateRadiationFactory::create\_facet(), jeod::RadiationFacet::initialize(), jeod::RadiationSurface::initialize(), jeod::RadiationDefaultSurface::initialize(), jeod::RadiationBaseFacet::initialize(), jeod::RadiationThirdBody::initialize(), jeod::RadiationThirdBody::process\_third\_body(), and jeod::RadiationThirdBody::update\_third\_body\_state().

#### 8.6.5.4 char const \* jeod::RadiationMessages::operational\_setup\_error [static]

**Initial value:**

```
=
    "interactions/radiation_pressure/" "operational_setup_error"
```

Something internal went wrong in the setup methods without obvious user error.

trick\_units(-)

Definition at line 108 of file radiation\_messages.hh.

Referenced by jeod::RadiationSurface::allocate\_array(), jeod::RadiationSurface::allocate\_interaction\_facet(), jeod::RadiationSurface::initialize(), jeod::RadiationDefaultSurface::initialize(), and jeod::RadiationThirdBody::process\_third\_body().

#### 8.6.5.5 char const \* jeod::RadiationMessages::unknown\_numerical\_error [static]

**Initial value:**

```
=
    "interactions/radiation_pressure/" "unknown_numerical_error"
```

Something went horribly wrong.

trick\_units(-)

Definition at line 117 of file radiation\_messages.hh.

Referenced by jeod::FlatPlateRadiationFacet::radiation\_pressure().

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

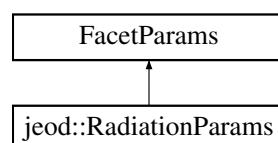
- [radiation\\_messages.hh](#)
- [radiation\\_messages.cc](#)

## 8.7 jeod::RadiationParams Class Reference

Provides a parameter list to each facet, based on the facet material properties.

```
#include <radiation_params.hh>
```

Inheritance diagram for jeod::RadiationParams:



## Public Member Functions

- [RadiationParams](#) ()  
*Constructor for [RadiationParams](#).*
- [~RadiationParams](#) () override  
*Destructor for [RadiationParams](#).*

## Data Fields

- double [albedo](#)  
*Fraction of incident radiation that is immediately reflected.*
- double [diffuse](#)  
*Fraction of reflected radiation that is reflected diffusely (balance reflected specularly)*
- ThermalParams [thermal](#)  
*Additional thermal parameters.*

## Private Member Functions

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

## Friends

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

### 8.7.1 Detailed Description

Provides a parameter list to each facet, based on the facet material properties.

Definition at line 83 of file radiation\_params.hh.

### 8.7.2 Constructor & Destructor Documentation

#### 8.7.2.1 `jeod::RadiationParams::RadiationParams ( void )`

Constructor for [RadiationParams](#).

Definition at line 43 of file radiation\_params.cc.

References [albedo](#), and [diffuse](#).

#### 8.7.2.2 `jeod::RadiationParams::~~RadiationParams ( void )` [override]

Destructor for [RadiationParams](#).

Definition at line 53 of file radiation\_params.cc.

8.7.2.3 `jeod::RadiationParams::RadiationParams ( const RadiationParams & rhs ) [private]`

### 8.7.3 Member Function Documentation

8.7.3.1 `RadiationParams& jeod::RadiationParams::operator= ( const RadiationParams & rhs ) [private]`

### 8.7.4 Friends And Related Function Documentation

8.7.4.1 `void init_attrjeod__RadiationParams ( ) [friend]`

8.7.4.2 `friend class InputProcessor [friend]`

Definition at line 85 of file `radiation_params.hh`.

### 8.7.5 Field Documentation

8.7.5.1 `double jeod::RadiationParams::albedo`

Fraction of incident radiation that is immediately reflected.

`trick_units(-)`

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

Referenced by `jeod::RadiationFacet::define_facet_core()`, and `RadiationParams()`.

8.7.5.2 `double jeod::RadiationParams::diffuse`

Fraction of reflected radiation that is reflected diffusely (balance reflected specularly)

`trick_units(-)`

Definition at line 99 of file `radiation_params.hh`.

Referenced by `jeod::RadiationFacet::define_facet_core()`, and `RadiationParams()`.

8.7.5.3 `ThermalParams jeod::RadiationParams::thermal`

Additional thermal parameters.

`trick_units(-)`

Definition at line 104 of file `radiation_params.hh`.

Referenced by `jeod::RadiationFacet::define_facet_core()`.

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

- [radiation\\_params.hh](#)
- [radiation\\_params.cc](#)

## 8.8 jeod::RadiationPressure Class Reference

Radiation pressure top-level definition.

```
#include <radiation_pressure.hh>
```

## Public Member Functions

- [RadiationPressure](#) ()  
*Constructor for [RadiationPressure](#).*
- virtual [~RadiationPressure](#) ()  
*Destructor for [RadiationPressure](#).*
- void [initialize](#) (DynManager &dyn\_manager, [RadiationSurface](#) \*surf\_ptr, double center\_grav[3])  
*Initialize the radiation pressure model when using a [RadiationSurface](#) (i.e.*
- void [initialize](#) (DynManager &dyn\_manager, [RadiationDefaultSurface](#) \*surf\_ptr)  
*Initialize the radiation pressure model when using a [RadiationDefaultSurface](#) (i.e.*
- void [update](#) (RefFrame &vehicle\_structural\_frame, double center\_grav[3], double scale\_factor, double time)  
*Updates the model at each time step.*
- void [add\\_third\\_body](#) ([RadiationThirdBody](#) \*third\_body\_ptr)  
*Adds a third body to the vector storage of third bodies.*
- void [set\\_third\\_body\\_active](#) (const char \*third\_body\_name)  
*Sets a Third Body to be active when it previously was not.*
- void [set\\_third\\_body\\_inactive](#) (const char \*third\_body\_name)  
*Sets a Third Body to be inactive when it previously was not.*
- void [set\\_calculate\\_forces](#) (bool calc\_forces)  
*Sets the value calculate\_forces.*

## Data Fields

- bool [active](#)  
*Is radiation pressure desired?*
- double [force](#) [3]  
*Net force due to radiation.*
- double [torque](#) [3]  
*Net torque due to radiation.*
- double [illum\\_factor](#)  
*fraction of primary flux that is not eclipsed*
- [RadiationSource](#) [source](#)  
*Collection of data for radiation source.*
- ThermalModelRider [thermal](#)  
*Rider to allow dynamic thermal variation on facets in this model.*

## Protected Member Functions

- void [update\\_default\\_surface](#) (void)  
*Used to update the model when the surface is a default surface.*
- void [update\\_facet\\_surface](#) (void)  
*Used to update the model when the surface comprises facets.*
- void [initialize\\_environment](#) (DynManager \*dyn\_mgr\_ptr)  
*Initializes the source and third bodies.*
- void [third\\_body\\_adjustments](#) (double time, RefFrame &vehicle\_structural\_frame)  
*Used to modify the flux for shadowing.*
- int [find\\_third\\_body](#) (const char \*third\_body\_name)  
*Finds the index of a third body based on its name.*

## Protected Attributes

- bool [initialized](#)  
*Has model been initialized?*
- bool [calculate\\_forces](#)  
*Flag to indicate whether forces and torques should be calculated.*
- bool [third\\_bodies\\_active](#)  
*Flag indicates whether there are any of the third bodies currently active.*
- unsigned int [num\\_third\\_bodies](#)  
*Number of ThirdBodies available.*
- JeodPointerVector  
  < [RadiationThirdBody](#) >::type [third\\_bodies](#)  
*Planetary bodies that provide shadowing or indirect, reflected, illumination.*
- [RadiationSurface](#) \* [surface\\_ptr](#)  
*The surface over which the radiation pressure will be collected.*
- [RadiationDefaultSurface](#) \* [default\\_surface\\_ptr](#)  
*If no surface is defined, use a DefaultSurface; this is the pointer to that default surface,.*
- DynManager \* [dyn\\_manager\\_ptr](#)  
*Pointer to the Dynamics Manager.*

## Private Member Functions

- [RadiationPressure](#) (const [RadiationPressure](#) &)
- [RadiationPressure](#) & [operator=](#) (const [RadiationPressure](#) &)

## Friends

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

### 8.8.1 Detailed Description

Radiation pressure top-level definition.

Definition at line 93 of file radiation\_pressure.hh.

### 8.8.2 Constructor & Destructor Documentation

#### 8.8.2.1 jeod::RadiationPressure::RadiationPressure ( void )

Constructor for [RadiationPressure](#).

Definition at line 68 of file radiation\_pressure.cc.

References [active](#), [calculate\\_forces](#), [default\\_surface\\_ptr](#), [dyn\\_manager\\_ptr](#), [force](#), [illum\\_factor](#), [initialized](#), [num\\_third\\_bodies](#), [surface\\_ptr](#), [third\\_bodies](#), [third\\_bodies\\_active](#), and [torque](#).

#### 8.8.2.2 jeod::RadiationPressure::~~RadiationPressure ( void ) [virtual]

Destructor for [RadiationPressure](#).

Definition at line 394 of file radiation\_pressure.cc.

References [third\\_bodies](#).

8.8.2.3 `jeod::RadiationPressure::RadiationPressure ( const RadiationPressure & ) [private]`

### 8.8.3 Member Function Documentation

8.8.3.1 `void jeod::RadiationPressure::add_third_body ( RadiationThirdBody * third_body_ptr )`

Adds a third body to the vector storage of third bodies.

#### Parameters

in	<i>third_body_ptr</i>	pointer to ThirdBody
----	-----------------------	----------------------

Definition at line 183 of file radiation\_pressure.cc.

References `jeod::RadiationThirdBody::active`, `dyn_manager_ptr`, `jeod::RadiationThirdBody::get_added_to_model()`, `jeod::RadiationMessages::incomplete_setup_error`, `jeod::RadiationThirdBody::initialize()`, `initialized`, `jeod::RadiationMessages::invalid_setup_error`, `jeod::RadiationThirdBody::name`, `num_third_bodies`, `jeod::RadiationThirdBody::set_added_to_model()`, `third_bodies`, and `third_bodies_active`.

Referenced by `initialize()`.

8.8.3.2 `int jeod::RadiationPressure::find_third_body ( const char * third_body_name ) [protected]`

Finds the index of a third body based on its name.

#### Returns

void

#### Parameters

in	<i>third_body_name</i>	Name of ThirdBody
----	------------------------	-------------------

Definition at line 358 of file radiation\_pressure.cc.

References `jeod::RadiationMessages::invalid_function_call`, `num_third_bodies`, and `third_bodies`.

Referenced by `set_third_body_active()`, and `set_third_body_inactive()`.

8.8.3.3 `void jeod::RadiationPressure::initialize ( DynManager & dyn_mgr, RadiationSurface * surf_ptr, double center_grav[3] )`

Initialize the radiation pressure model when using a [RadiationSurface](#) (i.e. with facets).

#### Parameters

in	<i>dyn_mgr</i>	The dynamics manager
in	<i>surf_ptr</i>	pointer to the radiation surface
in	<i>center_grav</i>	position of center of mass Units: M

Definition at line 75 of file radiation\_pressure\_\_surface\_model.cc.

References `add_third_body()`, `dyn_manager_ptr`, `jeod::RadiationSurface::initialize()`, `initialize_environment()`, `jeod::RadiationSource::num_bodies`, `jeod::RadiationSource::shadow_geometry`, `source`, `surface_ptr`, `thermal`, `third_bodies`, and `jeod::RadiationSource::third_body`.

8.8.3.4 `void jeod::RadiationPressure::initialize ( DynManager & dyn_mgr, RadiationDefaultSurface * surf_ptr )`

Initialize the radiation pressure model when using a [RadiationDefaultSurface](#) (i.e.

spherical, uniform properties.)

**Parameters**

in	<i>dyn_mgr</i>	The dynamics manager
in	<i>surf_ptr</i>	pointer to the radiation surface

Definition at line 71 of file radiation\_pressure\_\_default\_surface.cc.

References add\_third\_body(), default\_surface\_ptr, dyn\_manager\_ptr, jeod::RadiationDefaultSurface::initialize(), initialize\_environment(), jeod::RadiationSource::num\_bodies, jeod::RadiationSource::shadow\_geometry, source, third\_bodies, and jeod::RadiationSource::third\_body.

**8.8.3.5 void jeod::RadiationPressure::initialize\_environment ( DynManager \* *dyn\_mgr\_ptr* ) [protected]**

Initializes the source and third bodies.

**Parameters**

in	<i>dyn_mgr_ptr</i>	The dynamics manager
----	--------------------	----------------------

Definition at line 93 of file radiation\_pressure.cc.

References jeod::RadiationSource::initialize(), initialized, num\_third\_bodies, source, and third\_bodies.

Referenced by initialize().

**8.8.3.6 RadiationPressure& jeod::RadiationPressure::operator= ( const RadiationPressure & ) [private]**

**8.8.3.7 void jeod::RadiationPressure::set\_calculate\_forces ( bool *value* )**

Sets the value calculate\_forces.

**Parameters**

in	<i>value</i>	whether forces are needed
----	--------------	---------------------------

Definition at line 379 of file radiation\_pressure.cc.

References calculate\_forces, force, and torque.

**8.8.3.8 void jeod::RadiationPressure::set\_third\_body\_active ( const char \* *third\_body\_name* )**

Sets a Third Body to be active when it previously was not.

**Parameters**

in	<i>third_body_name</i>	Name of ThirdBody
----	------------------------	-------------------

Definition at line 280 of file radiation\_pressure.cc.

References active, dyn\_manager\_ptr, find\_third\_body(), jeod::RadiationMessages::invalid\_function\_call, third\_bodies, and third\_bodies\_active.

**8.8.3.9 void jeod::RadiationPressure::set\_third\_body\_inactive ( const char \* *third\_body\_name* )**

Sets a Third Body to be inactive when it previously was not.

**Parameters**



in	<i>third_body_ - name</i>	Name of ThirdBody
----	-------------------------------	-------------------

Definition at line 317 of file radiation\_pressure.cc.

References active, dyn\_manager\_ptr, find\_third\_body(), jeod::RadiationMessages::invalid\_function\_call, num\_third\_bodies, third\_bodies, and third\_bodies\_active.

**8.8.3.10** void jeod::RadiationPressure::third\_body\_adjustments ( double *real\_time*, RefFrame & *veh\_struc\_frame* )  
[protected]

Used to modify the flux for shadowing.

Parameters

in	<i>real_time</i>	The current time, e.g. TAI or UT1. Units: s
in	<i>veh_struc_frame</i>	Structure frame of vehicle

Definition at line 159 of file radiation\_pressure.cc.

References active, jeod::RadiationSource::flux\_inertial, jeod::RadiationSource::flux\_mag, jeod::RadiationSource::flux\_struc, illum\_factor, num\_third\_bodies, source, and third\_bodies.

Referenced by update().

**8.8.3.11** void jeod::RadiationPressure::update ( RefFrame & *veh\_struc\_frame*, double *center\_grav*[3], double *scale\_factor*, double *real\_time* )

Updates the model at each time step.

Parameters

in	<i>veh_struc_frame</i>	The vehicle structural reference frame.
in	<i>center_grav</i>	position of center of mass Units: M
in	<i>scale_factor</i>	the scale between the simulator time and the dynamic time.
in	<i>real_time</i>	The current time, e.g. TAI or UT1. Units: s

Definition at line 114 of file radiation\_pressure.cc.

References active, jeod::RadiationSource::calculate\_flux(), source, surface\_ptr, third\_bodies\_active, third\_body\_adjustments(), update\_default\_surface(), and update\_facet\_surface().

**8.8.3.12** void jeod::RadiationPressure::update\_default\_surface ( void ) [protected]

Used to update the model when the surface is a default surface.

Definition at line 96 of file radiation\_pressure\_\_default\_surface.cc.

References active, calculate\_forces, default\_surface\_ptr, jeod::RadiationBaseFacet::F\_absorption, jeod::RadiationBaseFacet::F\_diffuse, jeod::RadiationBaseFacet::F\_specular, jeod::RadiationSource::flux\_mag, jeod::RadiationSource::flux\_struc\_hat, force, jeod::RadiationDefaultSurface::incident\_radiation(), jeod::RadiationBaseFacet::initialize\_runtime\_values(), jeod::RadiationBaseFacet::interact\_with\_third\_body(), num\_third\_bodies, source, jeod::RadiationDefaultSurface::thermal\_update(), third\_bodies, and torque.

Referenced by update().

### 8.8.3.13 void jeod::RadiationPressure::update\_facet\_surface ( void ) [protected]

Used to update the model when the surface comprises facets.

Definition at line 111 of file radiation\_pressure\_\_surface\_model.cc.

References active, calculate\_forces, jeod::RadiationSurface::equalize\_absorption\_emission(), jeod::RadiationSource::flux\_mag, jeod::RadiationSource::flux\_struct\_hat, force, jeod::RadiationSurface::force, jeod::RadiationSurface::incident\_radiation(), jeod::RadiationSurface::initialize\_runtime\_values(), jeod::RadiationSurface::interact\_with\_third\_body(), num\_third\_bodies, jeod::RadiationSurface::radiation\_pressure(), source, surface\_ptr, thermal, third\_bodies, torque, and jeod::RadiationSurface::torque.

Referenced by update().

## 8.8.4 Friends And Related Function Documentation

### 8.8.4.1 void init\_attrjeod\_\_RadiationPressure ( ) [friend]

### 8.8.4.2 friend class InputProcessor [friend]

Definition at line 95 of file radiation\_pressure.hh.

## 8.8.5 Field Documentation

### 8.8.5.1 bool jeod::RadiationPressure::active

Is radiation pressure desired?

trick\_units(-)

Definition at line 103 of file radiation\_pressure.hh.

Referenced by RadiationPressure(), set\_third\_body\_active(), set\_third\_body\_inactive(), third\_body\_adjustments(), update(), update\_default\_surface(), and update\_facet\_surface().

### 8.8.5.2 bool jeod::RadiationPressure::calculate\_forces [protected]

Flag to indicate whether forces and torques should be calculated.

trick\_units(-)

Definition at line 140 of file radiation\_pressure.hh.

Referenced by RadiationPressure(), set\_calculate\_forces(), update\_default\_surface(), and update\_facet\_surface().

### 8.8.5.3 RadiationDefaultSurface\* jeod::RadiationPressure::default\_surface\_ptr [protected]

If no surface is defined, use a DefaultSurface; this is the pointer to that default surface.

trick\_units(-)

Definition at line 170 of file radiation\_pressure.hh.

Referenced by initialize(), RadiationPressure(), and update\_default\_surface().

### 8.8.5.4 DynManager\* jeod::RadiationPressure::dyn\_manager\_ptr [protected]

Pointer to the Dynamics Manager.

trick\_units(-)

Definition at line 175 of file radiation\_pressure.hh.

Referenced by add\_third\_body(), initialize(), RadiationPressure(), set\_third\_body\_active(), and set\_third\_body\_inactive().

#### 8.8.5.5 double jeod::RadiationPressure::force[3]

Net force due to radiation.

trick\_units(N)

Definition at line 108 of file radiation\_pressure.hh.

Referenced by RadiationPressure(), set\_calculate\_forces(), update\_default\_surface(), and update\_facet\_surface().

#### 8.8.5.6 double jeod::RadiationPressure::illum\_factor

fraction of primary flux that is not eclipsed

trick\_units(—)

Definition at line 118 of file radiation\_pressure.hh.

Referenced by RadiationPressure(), and third\_body\_adjustments().

#### 8.8.5.7 bool jeod::RadiationPressure::initialized [protected]

Has model been initialized?

trick\_units(—)

Definition at line 135 of file radiation\_pressure.hh.

Referenced by add\_third\_body(), initialize\_environment(), and RadiationPressure().

#### 8.8.5.8 unsigned int jeod::RadiationPressure::num\_third\_bodies [protected]

Number of ThirdBodies available.

trick\_units(count)

Definition at line 151 of file radiation\_pressure.hh.

Referenced by add\_third\_body(), find\_third\_body(), initialize\_environment(), RadiationPressure(), set\_third\_body\_inactive(), third\_body\_adjustments(), update\_default\_surface(), and update\_facet\_surface().

#### 8.8.5.9 RadiationSource jeod::RadiationPressure::source

Collection of data for radiation source.

trick\_units(—)

Definition at line 123 of file radiation\_pressure.hh.

Referenced by initialize(), initialize\_environment(), third\_body\_adjustments(), update(), update\_default\_surface(), and update\_facet\_surface().

#### 8.8.5.10 RadiationSurface\* jeod::RadiationPressure::surface\_ptr [protected]

The surface over which the radiation pressure will be collected.

If this is NULL, use the default radiation surface (which is a whole separate entity from a RadiationSurface.trick\_units(—)

Definition at line 164 of file radiation\_pressure.hh.

Referenced by initialize(), RadiationPressure(), update(), and update\_facet\_surface().

#### 8.8.5.11 ThermalModelRider jeod::RadiationPressure::thermal

Rider to allow dynamic thermal variation on facets in this model.

trick\_units(-)

Definition at line 128 of file radiation\_pressure.hh.

Referenced by initialize(), and update\_facet\_surface().

#### 8.8.5.12 JeodPointerVector<RadiationThirdBody>::type jeod::RadiationPressure::third\_bodies [protected]

Planetary bodies that provide shadowing or indirect, reflected, illumination.

trick\_io(\*\*)

Definition at line 157 of file radiation\_pressure.hh.

Referenced by add\_third\_body(), find\_third\_body(), initialize(), initialize\_environment(), RadiationPressure(), set\_third\_body\_active(), set\_third\_body\_inactive(), third\_body\_adjustments(), update\_default\_surface(), update\_facet\_surface(), and ~RadiationPressure().

#### 8.8.5.13 bool jeod::RadiationPressure::third\_bodies\_active [protected]

Flag indicates whether there are any of the third bodies currently active.

trick\_units(-)

Definition at line 146 of file radiation\_pressure.hh.

Referenced by add\_third\_body(), RadiationPressure(), set\_third\_body\_active(), set\_third\_body\_inactive(), and update().

#### 8.8.5.14 double jeod::RadiationPressure::torque[3]

Net torque due to radiation.

trick\_units(N\*m)

Definition at line 113 of file radiation\_pressure.hh.

Referenced by RadiationPressure(), set\_calculate\_forces(), update\_default\_surface(), and update\_facet\_surface().

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

- [radiation\\_pressure.hh](#)
- [radiation\\_pressure.cc](#)
- [radiation\\_pressure\\_\\_default\\_surface.cc](#)
- [radiation\\_pressure\\_\\_surface\\_model.cc](#)

## 8.9 jeod::RadiationSource Class Reference

Provides information on the source of the incident radiation.

```
#include <radiation_source.hh>
```

## Public Types

- enum [OldShadowGeometry](#) { [Cylindrical](#) = 0, [Cyl](#) = 1, [Conical](#) = 2, [Con](#) = 3 }  
*distinguishes between conical and cylindrical shadowing.*

## Public Member Functions

- [RadiationSource](#) ()  
*Constructor for [RadiationSource](#).*
- virtual [~RadiationSource](#) ()  
*destructor for [RadiationSource](#)*
- virtual void [initialize](#) (DynManager \*dyn\_manager\_ptr)  
*Initializes the source object for use in the Radiation Pressure model.*
- virtual void [calculate\\_flux](#) (RefFrame &veh\_struc\_frame, const double center\_grav[3])  
*calculates the flux vector from the vehicle's position.*
- void [set\\_name](#) (std::string name\_in)  
*Setter for the name.*

## Data Fields

- const double [solar\\_luminosity](#)  
*Solar Luminosity.*
- const double [solar\\_radius](#)  
*Mean solar radius.*
- std::string [name](#)  
*The name of the source of the illumination (usually Sun)*
- double [flux\\_hat](#) [3]  
*(inertial) unit vector associated with primary radiative flux.*
- double [flux\\_mag](#)  
*magnitude of principle radiative flux vector*
- double [d\\_source\\_to\\_cg](#)  
*distance from source to vehicle cg.*
- double [luminosity](#)  
*Luminosity of primary source.*
- double [radius](#)  
*Radius of primary source.*
- double [flux\\_inertial](#) [3]  
*(N/M\*s) Power per unit area in the inertial reference frame*
- double [flux\\_struc](#) [3]  
*(N/M\*s) Power per unit area in the vehicle structural reference frame*
- double [flux\\_struc\\_hat](#) [3]  
*Unit vector representing flux vector in the vehicle structural reference frame.*
- double [inertial\\_cg](#) [3]  
*vehicle cg position w.r.t vehicle strucural origin, expressed in inertial RF.*
- double [source\\_to\\_cg](#) [3]  
*vehicle cg position relative to the source*
- double [source\\_to\\_struc\\_origin](#) [3]  
*vehicle struc frame origin position relative to source.*
- bool [multiple\\_shadow\\_bodies](#)  
*flags that more than one body are casting shadows on the vehicle.*

- RefFrame \* [inertial\\_frame\\_ptr](#)  
*the inertial reference frame associated with this source*
- bool [bodies\\_active](#)  
*can there be 3rd-body interference, either shadowing or reflection.*
- unsigned int [num\\_bodies](#)  
*number of ThirdBodies available.*
- RadiationThirdBody \*\* [third\\_body](#)  
*Planetary bodies that provide shadowing or indirect, reflected, illumination.*
- OldShadowGeometry [shadow\\_geometry](#)  
*Flag indicating cylindrical / conical shadow geometry.*

## Private Member Functions

- [RadiationSource](#) (const [RadiationSource](#) &)
- [RadiationSource](#) & [operator=](#) (const [RadiationSource](#) &)

## Friends

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

### 8.9.1 Detailed Description

Provides information on the source of the incident radiation.

Definition at line 92 of file radiation\_source.hh.

### 8.9.2 Member Enumeration Documentation

#### 8.9.2.1 enum jeod::RadiationSource::OldShadowGeometry

distinguishes between conical and cylindrical shadowing.

NOTE this is provided for backward-compatibility and should not be used.

#### Enumerator

- Cylindrical** planet casts a cylindrical shadow
- Cyl** planet casts a cylindrical shadow
- Conical** planet casts a conical shadow
- Con** planet casts a conical shadow

Definition at line 209 of file radiation\_source.hh.

### 8.9.3 Constructor & Destructor Documentation

#### 8.9.3.1 jeod::RadiationSource::RadiationSource ( void )

Constructor for [RadiationSource](#).

Definition at line 64 of file radiation\_source.cc.

References [d\\_source\\_to\\_cg](#), [flux\\_hat](#), [flux\\_inertial](#), [flux\\_mag](#), [flux\\_struc](#), [flux\\_struc\\_hat](#), [inertial\\_cg](#), [inertial\\_frame\\_ptr](#), [luminosity](#), [multiple\\_shadow\\_bodies](#), [radius](#), [solar\\_luminosity](#), [solar\\_radius](#), [source\\_to\\_cg](#), and [source\\_to\\_struc\\_origin](#).

8.9.3.2 `jeod::RadiationSource::~~RadiationSource ( void ) [virtual]`

destructor for [RadiationSource](#)

Definition at line 189 of file `radiation_source.cc`.

8.9.3.3 `jeod::RadiationSource::RadiationSource ( const RadiationSource & ) [private]`

## 8.9.4 Member Function Documentation

8.9.4.1 `void jeod::RadiationSource::calculate_flux ( RefFrame & veh_struc_frame, const double center_gravity[3] ) [virtual]`

calculates the flux vector from the vehicle's position.

### Parameters

in	<i>veh_struc_frame</i>	the vehicle structural reference frame
in	<i>center_gravity</i>	position of the center of mass Units: M

Definition at line 102 of file `radiation_source.cc`.

References `d_source_to_cg`, `flux_hat`, `flux_inertial`, `flux_mag`, `flux_struc`, `flux_struc_hat`, `inertial_cg`, `inertial_frame_ptr`, `luminosity`, `source_to_cg`, and `source_to_struc_origin`.

Referenced by `jeod::RadiationPressure::update()`.

8.9.4.2 `void jeod::RadiationSource::initialize ( DynManager * dyn_mgr_ptr ) [virtual]`

Initializes the source object for use in the Radiation Pressure model.

### Parameters

in	<i>dyn_mgr_ptr</i>	pointer to the dynamics manager
----	--------------------	---------------------------------

Definition at line 166 of file `radiation_source.cc`.

References `jeod::RadiationMessages::incomplete_setup_error`, `inertial_frame_ptr`, and `name`.

Referenced by `jeod::RadiationPressure::initialize_environment()`.

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

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

Setter for the name.

Definition at line 235 of file `radiation_source.hh`.

References `name`.

## 8.9.5 Friends And Related Function Documentation

8.9.5.1 `void init_attrjeod_RadiationSource ( ) [friend]`

8.9.5.2 `friend class InputProcessor [friend]`

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

## 8.9.6 Field Documentation

### 8.9.6.1 `bool jeod::RadiationSource::bodies_active`

can there be 3rd-body interference, either shadowing or reflection.

trick\_units(-)

Definition at line 191 of file radiation\_source.hh.

### 8.9.6.2 `double jeod::RadiationSource::d_source_to_cg`

distance from source to vehicle cg.

trick\_units(m)

Definition at line 127 of file radiation\_source.hh.

Referenced by `calculate_flux()`, `jeod::RadiationThirdBody::calculate_shadow()`, and `RadiationSource()`.

### 8.9.6.3 `double jeod::RadiationSource::flux_hat[3]`

(inertial) unit vector associated with primary radiative flux.

trick\_units(-)

Definition at line 116 of file radiation\_source.hh.

Referenced by `calculate_flux()`, and `RadiationSource()`.

### 8.9.6.4 `double jeod::RadiationSource::flux_inertial[3]`

(N/M/s) Power per unit area in the inertial reference frame

trick\_units(-)

Definition at line 142 of file radiation\_source.hh.

Referenced by `calculate_flux()`, `RadiationSource()`, and `jeod::RadiationPressure::third_body_adjustments()`.

### 8.9.6.5 `double jeod::RadiationSource::flux_mag`

magnitude of principle radiative flux vector

trick\_units(N/m2)

Definition at line 121 of file radiation\_source.hh.

Referenced by `calculate_flux()`, `RadiationSource()`, `jeod::RadiationPressure::third_body_adjustments()`, `jeod::RadiationPressure::update_default_surface()`, and `jeod::RadiationPressure::update_facet_surface()`.

### 8.9.6.6 `double jeod::RadiationSource::flux_struc[3]`

(N/M\*s) Power per unit area in the vehicle structural reference frame

trick\_units(-)

Definition at line 147 of file radiation\_source.hh.

Referenced by `calculate_flux()`, `RadiationSource()`, and `jeod::RadiationPressure::third_body_adjustments()`.



**8.9.6.7 double jeod::RadiationSource::flux\_struct\_hat[3]**

Unit vector representing flux vector in the vehicle structural reference frame.

trick\_units(-)

Definition at line 153 of file radiation\_source.hh.

Referenced by calculate\_flux(), RadiationSource(), jeod::RadiationPressure::update\_default\_surface(), and jeod::RadiationPressure::update\_facet\_surface().

**8.9.6.8 double jeod::RadiationSource::inertial\_cg[3]**

vehicle cg position w.r.t vehicle structural origin, expressed in inertial RF.

trick\_units(m)

Definition at line 159 of file radiation\_source.hh.

Referenced by calculate\_flux(), and RadiationSource().

**8.9.6.9 RefFrame\* jeod::RadiationSource::inertial\_frame\_ptr**

the inertial reference frame associated with this source

trick\_units(-)

Definition at line 179 of file radiation\_source.hh.

Referenced by calculate\_flux(), initialize(), jeod::RadiationThirdBody::initialize(), RadiationSource(), and jeod::RadiationThirdBody::update\_third\_body\_state().

**8.9.6.10 double jeod::RadiationSource::luminosity**

Luminosity of primary source.

trick\_units(-)

Definition at line 132 of file radiation\_source.hh.

Referenced by calculate\_flux(), and RadiationSource().

**8.9.6.11 bool jeod::RadiationSource::multiple\_shadow\_bodies**

flags that more than one body are casting shadows on the vehicle.

trick\_units(-)

Definition at line 174 of file radiation\_source.hh.

Referenced by RadiationSource().

**8.9.6.12 std::string jeod::RadiationSource::name**

The name of the source of the illumination (usually Sun)

trick\_units(-)

Definition at line 111 of file radiation\_source.hh.

Referenced by initialize(), and set\_name().

**8.9.6.13 unsigned int jeod::RadiationSource::num\_bodies**

number of ThirdBodies available.

trick\_units(count)

Definition at line 196 of file radiation\_source.hh.

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

**8.9.6.14 double jeod::RadiationSource::radius**

Radius of primary source.

trick\_units(m)

Definition at line 137 of file radiation\_source.hh.

Referenced by jeod::RadiationThirdBody::calculate\_shadow(), jeod::RadiationThirdBody::initialize(), and RadiationSource().

**8.9.6.15 OldShadowGeometry jeod::RadiationSource::shadow\_geometry**

Flag indicating cylindrical / conical shadow geometry.

trick\_units(-)

Definition at line 219 of file radiation\_source.hh.

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

**8.9.6.16 const double jeod::RadiationSource::solar\_luminosity**

Solar Luminosity.

trick\_units(-)

Definition at line 101 of file radiation\_source.hh.

Referenced by RadiationSource().

**8.9.6.17 const double jeod::RadiationSource::solar\_radius**

Mean solar radius.

trick\_units(m)

Definition at line 106 of file radiation\_source.hh.

Referenced by RadiationSource().

**8.9.6.18 double jeod::RadiationSource::source\_to\_cg[3]**

vehicle cg position relative to the source

trick\_units(m)

Definition at line 164 of file radiation\_source.hh.

Referenced by calculate\_flux(), jeod::RadiationThirdBody::calculate\_shadow(), and RadiationSource().

## 8.9.6.19 double jeod::RadiationSource::source\_to\_struc\_origin[3]

vehicle struc frame origin position relative to source.

trick\_units(m)

Definition at line 169 of file radiation\_source.hh.

Referenced by calculate\_flux(), and RadiationSource().

## 8.9.6.20 RadiationThirdBody\*\* jeod::RadiationSource::third\_body

Planetary bodies that provide shadowing or indirect, reflected, illumination.

trick\_units(-)

Definition at line 202 of file radiation\_source.hh.

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

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

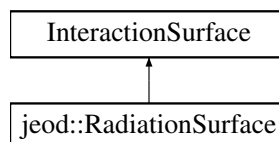
- [radiation\\_source.hh](#)
- [radiation\\_source.cc](#)

## 8.10 jeod::RadiationSurface Class Reference

The surface of the vehicle that interacts with the incident flux.

```
#include <radiation_surface.hh>
```

Inheritance diagram for jeod::RadiationSurface:



## Public Member Functions

- [RadiationSurface](#) ()  
*Constructor for [RadiationSurface](#).*
- [~RadiationSurface](#) () override  
*Destructor for [RadiationSurface](#).*
- void [initialize](#) (double center\_grav[3])  
*Initializes the radiation surface.*
- void [allocate\\_array](#) (unsigned int size) override  
*Allocates memory for an array of radiation facets.*
- void [allocate\\_interaction\\_facet](#) (Facet \*facet, InteractionFacetFactory \*factory, FacetParams \*params, unsigned int index) override  
*Turns facet memory into radiation facet memory.*
- void [initialize\\_runtime\\_values](#) (void)  
*To initialize the values during each update run.*
- void [incident\\_radiation](#) (double flux\_mag, const double flux\_struc\_hat[3], bool calculate\_forces)  
*systematically calls the method to calculate the interaction on each facet.*
- void [interact\\_with\\_third\\_body](#) ([RadiationThirdBody](#) \*third\_body\_ptr, const bool calculate\_forces)

- systematically calls the method to calculate the interaction of each facet with ThirdBody flux.*
- void [accumulate\\_thermal\\_sources](#) (void) override  
*systematically calls the method to accumulate thermal sources on each facet.*
- void [thermal\\_integrator](#) (void) override  
*systematically calls the method to integrate the temperature variation for each facet.*
- void [equalize\\_absorption\\_emission](#) (void)  
*systematically calls the method to ensure that the same for each facet.*
- void [radiation\\_pressure](#) (void)  
*systematically calls the method to wrap up the radiation pressure calculation on each facet and accumulate forces and torques over all facets.*
- void [add\\_thermal\\_integrators\\_to](#) (DynBody \*dyn\_body)  
*To attach thermal integrators from each facet to the integration group of a DynBody.*

## Data Fields

- [RadiationFacet](#) \*\* [facets](#)  
*Array of pointers to the Radiation Facets.*
- unsigned int [num\\_facets](#)  
*number of facets in this surface.*
- bool [include\\_conduction](#)  
*Flag to instruct model to include conduction between plates in the thermal calculation.*
- double \*\* [thermal\\_conduction](#)  
*Conductivity values (Watts per Kelvin) between facets.*
- double [force](#) [3]  
*Force resulting from all radiative interactions.*
- double [torque](#) [3]  
*Torque resulting from all radiative interactions.*
- unsigned int [ii\\_facet](#)  
*Simple counter, used repeatedly.*

## Private Member Functions

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

## Friends

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

### 8.10.1 Detailed Description

The surface of the vehicle that interacts with the incident flux.

Definition at line 89 of file radiation\_surface.hh.

### 8.10.2 Constructor & Destructor Documentation

#### 8.10.2.1 [jeod::RadiationSurface::RadiationSurface](#) ( void )

Constructor for [RadiationSurface](#).

Definition at line 65 of file radiation\_surface.cc.

#### 8.10.2.2 jeod::RadiationSurface::~~RadiationSurface ( void ) [override]

Destructor for [RadiationSurface](#).

Definition at line 374 of file radiation\_surface.cc.

References facets, ii\_facet, and num\_facets.

#### 8.10.2.3 jeod::RadiationSurface::RadiationSurface ( const RadiationSurface & rhs ) [private]

### 8.10.3 Member Function Documentation

#### 8.10.3.1 void jeod::RadiationSurface::accumulate\_thermal\_sources ( void ) [override]

systematically calls the method to accumulate thermal sources on each facet.

Definition at line 276 of file radiation\_surface.cc.

References facets, ii\_facet, num\_facets, and jeod::RadiationBaseFacet::thermal.

#### 8.10.3.2 void jeod::RadiationSurface::add\_thermal\_integrators\_to ( DynBody \* dyn\_body )

To attach thermal integrators from each facet to the integration group of a DynBody.

Parameters

in, out	<i>dyn_body</i>	Body to which integrators are to be added.
---------	-----------------	--

Definition at line 363 of file radiation\_surface.cc.

#### 8.10.3.3 void jeod::RadiationSurface::allocate\_array ( unsigned int size ) [override]

Allocates memory for an array of radiation facets.

Parameters

in	<i>size</i>	Size of array
----	-------------	---------------

Definition at line 140 of file radiation\_surface.cc.

References facets, ii\_facet, num\_facets, and jeod::RadiationMessages::operational\_setup\_error.

#### 8.10.3.4 void jeod::RadiationSurface::allocate\_interaction\_facet ( Facet \* facet, InteractionFacetFactory \* factory, FacetParams \* params, unsigned int index ) [override]

Turns facet memory into radiaiton facet memory.

Parameters

in	<i>facet</i>	pointer to the facet
in	<i>factory</i>	pointer to the facet factory
in	<i>params</i>	pointer to the generic facet parameter.
in	<i>index</i>	index value in the facet list.

Definition at line 174 of file radiation\_surface.cc.

References facets, jeod::RadiationMessages::invalid\_setup\_error, num\_facets, and jeod::RadiationMessages::operational\_setup\_error.

#### 8.10.3.5 void jeod::RadiationSurface::equalize\_absorption\_emission ( void )

systematically calls the method to ensure that the same for each facet.

Definition at line 311 of file radiation\_surface.cc.

References facets, ii\_facet, num\_facets, and jeod::RadiationBaseFacet::thermal.

Referenced by jeod::RadiationPressure::update\_facet\_surface().

#### 8.10.3.6 void jeod::RadiationSurface::incident\_radiation ( double flux\_mag, const double flux\_struc\_hat[3], bool calculate\_forces )

systematically calls the method to calculate the interaction on each facet.

##### Parameters

in	flux_mag	Magnitude of incident flux
in	flux_struc_hat	unit vector of incident flux
in	calculate_forces	boolean indicating whether to calculate forces.

Definition at line 239 of file radiation\_surface.cc.

References facets, ii\_facet, jeod::RadiationBaseFacet::incident\_radiation(), and num\_facets.

Referenced by jeod::RadiationPressure::update\_facet\_surface().

#### 8.10.3.7 void jeod::RadiationSurface::initialize ( double center\_grav[3] )

Initializes the radiation surface.

##### Parameters

in	center_grav	position of center of mass Units: M
----	-------------	--

Definition at line 85 of file radiation\_surface.cc.

References facets, ii\_facet, jeod::RadiationFacet::initialize\_geom(), jeod::RadiationMessages::invalid\_setup\_error, num\_facets, jeod::RadiationMessages::operational\_setup\_error, and jeod::RadiationBaseFacet::thermal.

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

#### 8.10.3.8 void jeod::RadiationSurface::initialize\_runtime\_values ( void )

To initialize the values during each update run.

Definition at line 347 of file radiation\_surface.cc.

References facets, ii\_facet, jeod::RadiationBaseFacet::initialize\_runtime\_values(), and num\_facets.

Referenced by jeod::RadiationPressure::update\_facet\_surface().

#### 8.10.3.9 void jeod::RadiationSurface::interact\_with\_third\_body ( RadiationThirdBody \* third\_body\_ptr, const bool calculate\_forces )

systematically calls the method to calculate the interaction of each facet with ThirdBody flux.

##### Parameters

<i>in, out</i>	<i>third_body_ptr</i>	Third body that emits radiation.
<i>in</i>	<i>calculate_forces</i>	Calculate forces on the surface if true.

Definition at line 261 of file radiation\_surface.cc.

References facets, ii\_facet, jeod::RadiationBaseFacet::interact\_with\_third\_body(), and num\_facets.

Referenced by jeod::RadiationPressure::update\_facet\_surface().

**8.10.3.10 RadiationSurface& jeod::RadiationSurface::operator= ( const RadiationSurface & rhs ) [private]**

**8.10.3.11 void jeod::RadiationSurface::radiation\_pressure ( void )**

systematically calls the method to wrap up the radiation pressure calculation on each facet and accumulate forces and torques over all facets.

Definition at line 326 of file radiation\_surface.cc.

References facets, force, ii\_facet, num\_facets, jeod::RadiationFacet::radiation\_pressure(), and torque.

Referenced by jeod::RadiationPressure::update\_facet\_surface().

**8.10.3.12 void jeod::RadiationSurface::thermal\_integrator ( void ) [override]**

systematically calls the method to integrate the temperature variation for each facet.

Definition at line 291 of file radiation\_surface.cc.

References facets, ii\_facet, num\_facets, and jeod::RadiationBaseFacet::thermal.

## 8.10.4 Friends And Related Function Documentation

**8.10.4.1 void init\_attrjeod\_RadiationSurface ( ) [friend]**

**8.10.4.2 friend class InputProcessor [friend]**

Definition at line 91 of file radiation\_surface.hh.

## 8.10.5 Field Documentation

**8.10.5.1 RadiationFacet\*\* jeod::RadiationSurface::facets**

Array of pointers to the Radiation Facets.

trick\_units(-)

Definition at line 98 of file radiation\_surface.hh.

Referenced by accumulate\_thermal\_sources(), allocate\_array(), allocate\_interaction\_facet(), equalize\_absorption\_emission(), incident\_radiation(), initialize(), initialize\_runtime\_values(), interact\_with\_third\_body(), radiation\_pressure(), thermal\_integrator(), and ~RadiationSurface().

**8.10.5.2 double jeod::RadiationSurface::force[3]**

Force resulting from all radiative interactions.

trick\_units(-)

Definition at line 122 of file radiation\_surface.hh.

Referenced by radiation\_pressure(), and jeod::RadiationPressure::update\_facet\_surface().

**8.10.5.3 unsigned int jeod::RadiationSurface::ii\_facet**

Simple counter, used repeatedly.

trick\_units(-)

Definition at line 132 of file radiation\_surface.hh.

Referenced by accumulate\_thermal\_sources(), allocate\_array(), equalize\_absorption\_emission(), incident\_radiation(), initialize(), initialize\_runtime\_values(), interact\_with\_third\_body(), radiation\_pressure(), thermal\_integrator(), and ~RadiationSurface().

**8.10.5.4 bool jeod::RadiationSurface::include\_conduction**

Flag to instruct model to include conduction between plates in the thermal calculation.

Requires a thermal\_conduction matrix.trick\_units(-)

Definition at line 109 of file radiation\_surface.hh.

**8.10.5.5 unsigned int jeod::RadiationSurface::num\_facets**

number of facets in this surface.

trick\_units(-)

Definition at line 103 of file radiation\_surface.hh.

Referenced by accumulate\_thermal\_sources(), allocate\_array(), allocate\_interaction\_facet(), equalize\_absorption\_emission(), incident\_radiation(), initialize(), initialize\_runtime\_values(), interact\_with\_third\_body(), radiation\_pressure(), thermal\_integrator(), and ~RadiationSurface().

**8.10.5.6 double\*\* jeod::RadiationSurface::thermal\_conduction**

Conductivity values (Watts per Kelvin) between facets.

Assumed symmetric, only the values [small][large] will be considered (e.g. thermal\_conduction[2][3] gives the conduction between facets 2 and 3, whereas thermal\_conduction[3][2] will never be seen.trick\_units(-)

Definition at line 117 of file radiation\_surface.hh.

**8.10.5.7 double jeod::RadiationSurface::torque[3]**

Torque resulting from all radiative interactions.

trick\_units(-)

Definition at line 127 of file radiation\_surface.hh.

Referenced by radiation\_pressure(), and jeod::RadiationPressure::update\_facet\_surface().

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

- [radiation\\_surface.hh](#)
- [radiation\\_surface.cc](#)

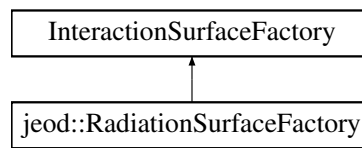
**8.11 jeod::RadiationSurfaceFactory Class Reference**

The factory for creating Radiation Surfaces.

```
#include <radiation_surface_factory.hh>
```



Inheritance diagram for jeod::RadiationSurfaceFactory:



## Public Member Functions

- [RadiationSurfaceFactory](#) ()  
*Constructor.*
- [~RadiationSurfaceFactory](#) () override  
*Destructor.*
- void [add\\_facet\\_params](#) (FacetParams \*to\_add) override  
*Add a set of radiation parameters to those available to Radiation Surface.*

## Protected Attributes

- [FlatPlateRadiationFactory](#) flat\_plate\_radiation\_factory  
*The factory to build flat plate thermal facets.*

## Private Member Functions

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

## Friends

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

### 8.11.1 Detailed Description

The factory for creating Radiation Surfaces.

Definition at line 85 of file radiation\_surface\_factory.hh.

### 8.11.2 Constructor & Destructor Documentation

#### 8.11.2.1 jeod::RadiationSurfaceFactory::RadiationSurfaceFactory ( void )

Constructor.

Definition at line 55 of file radiation\_surface\_factory.cc.

References [flat\\_plate\\_radiation\\_factory](#).

#### 8.11.2.2 jeod::RadiationSurfaceFactory::~~RadiationSurfaceFactory ( void ) [override]

Destructor.

Definition at line 99 of file radiation\_surface\_factory.cc.

8.11.2.3 `jeod::RadiationSurfaceFactory::RadiationSurfaceFactory ( const RadiationSurfaceFactory & rhs )`  
`[private]`

### 8.11.3 Member Function Documentation

8.11.3.1 `void jeod::RadiationSurfaceFactory::add_facet_params ( FacetParams * to_add )` `[override]`

Add a set of radiation parameters to those available to Radiation Surface.

Parameters

<code>in</code>	<code>to_add</code>	pointer to the parameter list to add.
-----------------	---------------------	---------------------------------------

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

References `jeod::RadiationMessages::invalid_setup_error`.

8.11.3.2 `RadiationSurfaceFactory& jeod::RadiationSurfaceFactory::operator= ( const RadiationSurfaceFactory & rhs )`  
`[private]`

### 8.11.4 Friends And Related Function Documentation

8.11.4.1 `void init_attrjeod__RadiationSurfaceFactory ( )` `[friend]`

8.11.4.2 `friend class InputProcessor` `[friend]`

Definition at line 87 of file `radiation_surface_factory.hh`.

### 8.11.5 Field Documentation

8.11.5.1 `FlatPlateRadiationFactory jeod::RadiationSurfaceFactory::flat_plate_radiation_factory` `[protected]`

The factory to build flat plate thermal facets.

`trick_units(-)`

Definition at line 111 of file `radiation_surface_factory.hh`.

Referenced by `RadiationSurfaceFactory()`.

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

- [radiation\\_surface\\_factory.hh](#)
- [radiation\\_surface\\_factory.cc](#)

## 8.12 jeod::RadiationThirdBody Class Reference

Provide information on bodies that may cause shadowing or reflected illumination.

```
#include <radiation_third_body.hh>
```

### Public Types

- enum [ShadowGeometry](#) { [Cylindrical](#) = 0, [Cyl](#) = 1, [Conical](#) = 2, [Con](#) = 3 }
- distinguishes between conical and cylindrical shadowing*

## Public Member Functions

- [RadiationThirdBody](#) ()  
*Constructor.*
- virtual [~RadiationThirdBody](#) ()
- virtual void [initialize](#) (DynManager \*dyn\_mgr\_ptr)  
*initializes the third body*
- void [calculate\\_shadow](#) (void)  
*Calculates the effect of shadowing by a third body.*
- void [convert\\_shadow\\_from\\_int](#) (int geometry)  
*convert from the old style framework in which the shadow geometry was owned by the [RadiationSource](#) (same for all third bodies) to the new style framework where the geometry is owned by each ThirdBody*
- virtual double [process\\_third\\_body](#) (double real\_time, RefFrame &veh\_struc\_frame)  
*Primary executable for handling the Third Body effects.*
- void [set\\_name](#) (std::string name\_in)  
*Setter for the name.*
- virtual void [accumulate\\_refl\\_flux](#) ([RadiationBaseFacet](#) \*veh\_surf\_elem, bool calculate\_forces)  
*To provide base class null implementation.*
- virtual void [accumulate\\_rad\\_flux](#) ([RadiationBaseFacet](#) \*veh\_surf\_elem, bool calculate\_forces)  
*To provide base class null implementation.*
- virtual bool [is\\_interactive](#) ()  
*Identifies this class as one that does not produce a radiation field.*
- bool [get\\_added\\_to\\_model](#) ()  
*Returns information on whether the body has already been used in one [RadiationPressure](#) model.*
- void [set\\_added\\_to\\_model](#) (bool value)  
*Sets the added\_to\_model value.*

## Data Fields

- [RadiationSource](#) \* [primary\\_source\\_ptr](#)  
*Pointer to the primary illumination source.*
- [ShadowGeometry](#) [shadow\\_geometry](#)  
*Flag indicating cylindrical / conical shadow geometry.*
- bool [force\\_state\\_update](#)  
*Flag to indicate whether to enforce an update to the third-body body-state.*
- std::string [name](#)  
*Name of planet.*
- bool [active](#)  
*Model on/off flag.*
- double [update\\_interval](#)  
*Time interval between third body state updates.*
- double [radius](#)  
*Radius of [RadiationThirdBody](#).*
- double [output\\_flux](#) [3]  
*Calculated value.*
- RefFrame \* [local\\_frame\\_ptr](#)  
*Pointer to the local reference frame, for determining position of this object.*

## Protected Member Functions

- double [generate\\_alpha](#) (double rho\_adj, double delta)  
*generate\_alpha( rho\_adj, delta: generates an approximate alpha-value given a relative disk size and fraction of maximum possible eclipse*
- bool [test\\_for\\_state\\_update](#) (double time)  
*Tests for necessity of updating third body state, and calls appropriate update method (polymorphic) if needed.*
- virtual bool [update\\_third\\_body\\_state](#) (void)  
*Updates the state of the Third Body.*

## Protected Attributes

- bool [added\\_to\\_model](#)  
*Flag to indicate whether body has already been added to a model.*
- bool [initialized](#)  
*Flag to indicate that initialization has been complete.*
- double [illum\\_factor](#)  
*Value between 0 and 1 representing the fraction of possible flux that is actually incident after shadowing effects.*
- double [last\\_update\\_time](#)  
*Time at which the third body state was last updated.*
- Planet \* [planet\\_link](#)  
*Pointer to the associated Planet object.*
- double [r\\_plus](#)  
*The value (radius + R\_source)*
- double [r\\_minus](#)  
*The value (radius - R\_source)*
- double [r\\_ratio](#)  
*The ratio (radius / R\_source)*
- double [r\\_par](#)  
*Component of vector from [RadiationThirdBody](#) to vehicle that is parallel to vector from primary source to [RadiationThirdBody](#).*
- double [r\\_perp](#)  
*Component of vector from [RadiationThirdBody](#) to vehicle that is perpendicular to vector from primary source to [RadiationThirdBody](#).*
- double [third\\_to\\_cg\\_inrtl](#) [3]  
*Vector from [RadiationThirdBody](#) to vehicle center of gravity, in inertial RF.*
- double [source\\_to\\_third\\_inrtl](#) [3]  
*Vector from the primary source to the [RadiationThirdBody](#) in inertial RF.*
- double [d\\_source\\_to\\_third](#)  
*Magnitude of source\_to\_third.*
- double [source\\_to\\_third\\_hat\\_inrtl](#) [3]  
*Unit vector of source\_to\_third.*

## Private Member Functions

- [RadiationThirdBody](#) (const [RadiationThirdBody](#) &)
- [RadiationThirdBody](#) & operator= (const [RadiationThirdBody](#) &)

## Friends

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

### 8.12.1 Detailed Description

Provide information on bodies that may cause shadowing or reflected illumination.

Definition at line 84 of file radiation\_third\_body.hh.

### 8.12.2 Member Enumeration Documentation

#### 8.12.2.1 enum jeod::RadiationThirdBody::ShadowGeometry

distinguishes between conical and cylindrical shadowing

Enumerator

**Cylindrical** planet casts a cylindrical shadow

**Cyl** planet casts a cylindrical shadow

**Conical** planet casts a conical shadow

**Con** planet casts a conical shadow

Definition at line 92 of file radiation\_third\_body.hh.

### 8.12.3 Constructor & Destructor Documentation

#### 8.12.3.1 jeod::RadiationThirdBody::RadiationThirdBody ( )

Constructor.

Definition at line 57 of file radiation\_third\_body.cc.

References output\_flux, source\_to\_third\_hat\_inrtl, source\_to\_third\_inrtl, and third\_to\_cg\_inrtl.

#### 8.12.3.2 virtual jeod::RadiationThirdBody::~~RadiationThirdBody ( ) [inline], [virtual]

Definition at line 238 of file radiation\_third\_body.hh.

#### 8.12.3.3 jeod::RadiationThirdBody::RadiationThirdBody ( const RadiationThirdBody & ) [private]

### 8.12.4 Member Function Documentation

#### 8.12.4.1 virtual void jeod::RadiationThirdBody::accumulate\_rad\_flux ( RadiationBaseFacet \* veh\_surf\_elem, bool calculate\_forces ) [inline], [virtual]

To provide base class null implementation.

Parameters

<i>veh_surf_elem</i>	The facet of the vehicle.
<i>calculate_forces</i>	pass-through flag.

Definition at line 272 of file radiation\_third\_body.hh.

Referenced by jeod::RadiationBaseFacet::interact\_with\_third\_body().

#### 8.12.4.2 virtual void jeod::RadiationThirdBody::accumulate\_refl\_flux ( RadiationBaseFacet \* veh\_surf\_elem, bool calculate\_forces ) [inline], [virtual]

To provide base class null implementation.

## Parameters

<i>veh_surf_elem</i>	The facet of the vehicle.
<i>calculate_forces</i>	pass-through flag.

Definition at line 264 of file radiation\_third\_body.hh.

Referenced by jeod::RadiationBaseFacet::interact\_with\_third\_body().

#### 8.12.4.3 void jeod::RadiationThirdBody::calculate\_shadow ( void )

Calculates the effect of shadowing by a third body.

NOTE - This method is intended to be an internal call so should be protected However, doing so would be a change to the API. Delay for JEOD4.0.

Definition at line 210 of file radiation\_third\_body.cc.

References active, Con, Conical, Cyl, Cylindrical, jeod::RadiationSource::d\_source\_to\_cg, d\_source\_to\_third, generate\_alpha(), illum\_factor, initialized, jeod::RadiationMessages::invalid\_setup\_error, name, primary\_source\_ptr, r\_minus, r\_par, r\_perp, r\_plus, r\_ratio, radius, jeod::RadiationSource::radius, shadow\_geometry, jeod::RadiationSource::source\_to\_cg, source\_to\_third\_hat\_inrtl, source\_to\_third\_inrtl, and third\_to\_cg\_inrtl.

Referenced by process\_third\_body().

#### 8.12.4.4 void jeod::RadiationThirdBody::convert\_shadow\_from\_int ( int old\_shadow\_geometry )

convert from the old style framework in which the shadow geometry was owned by the [RadiationSource](#) (same for all third bodies) to the new style framework where the geometry is owned by each ThirdBody

## Parameters

in	<i>old_shadow_geometry</i>	integer representation of the shadow geometry enumeration.
----	----------------------------	--

Definition at line 413 of file radiation\_third\_body.cc.

References jeod::RadiationMessages::invalid\_setup\_error, and shadow\_geometry.

#### 8.12.4.5 double jeod::RadiationThirdBody::generate\_alpha ( double rho\_adj, double delta ) [protected]

generate\_alpha( rho\_adj, delta: generates an approximate alpha-value given a relative disk size and fraction of maximum possible eclipse

## Parameters

in	<i>rho_adj</i>	relative disk size
in	<i>delta</i>	fraction of eclipse achieved.

Definition at line 380 of file radiation\_third\_body.cc.

Referenced by calculate\_shadow().

#### 8.12.4.6 bool jeod::RadiationThirdBody::get\_added\_to\_model ( ) [inline]

Returns information on whether the body has already been used in one [RadiationPressure](#) model.

Protects against multiple use of one ThirdBody instance.

## Returns

added\_to\_model

Definition at line 287 of file radiation\_third\_body.hh.

References added\_to\_model.

Referenced by jeod::RadiationPressure::add\_third\_body().

#### 8.12.4.7 void jeod::RadiationThirdBody::initialize ( DynManager \* *dyn\_mgr\_ptr* ) [virtual]

initializes the third body

## Parameters

in	<i>dyn_mgr_ptr</i>	pointer to the dynamics manager
----	--------------------	---------------------------------

Definition at line 92 of file radiation\_third\_body.cc.

References active, jeod::RadiationSource::inertial\_frame\_ptr, initialized, jeod::RadiationMessages::invalid\_setup\_error, local\_frame\_ptr, name, planet\_link, primary\_source\_ptr, r\_minus, r\_plus, r\_ratio, radius, and jeod::RadiationSource::radius.

Referenced by jeod::RadiationPressure::add\_third\_body().

#### 8.12.4.8 virtual bool jeod::RadiationThirdBody::is\_interactive ( ) [inline],[virtual]

Identifies this class as one that does not produce a radiation field.

## Returns

false

Definition at line 279 of file radiation\_third\_body.hh.

#### 8.12.4.9 RadiationThirdBody& jeod::RadiationThirdBody::operator= ( const RadiationThirdBody & ) [private]

#### 8.12.4.10 double jeod::RadiationThirdBody::process\_third\_body ( double *real\_time*, RefFrame & *veh\_struc\_frame* ) [virtual]

Primary executable for handling the Third Body effects.

## Returns

shading fraction

## Parameters

in	<i>real_time</i>	Current time. Units: s
in	<i>veh_struc_frame</i>	Unused.

Definition at line 435 of file radiation\_third\_body.cc.

References active, calculate\_shadow(), illum\_factor, initialized, jeod::RadiationMessages::invalid\_setup\_error, name, jeod::RadiationMessages::operational\_setup\_error, and test\_for\_state\_update().

#### 8.12.4.11 void jeod::RadiationThirdBody::set\_added\_to\_model ( bool *value* ) [inline]

Sets the added\_to\_model value.

**Parameters**

<i>value</i>	New value
--------------	-----------

Definition at line 293 of file radiation\_third\_body.hh.

References added\_to\_model.

Referenced by jeod::RadiationPressure::add\_third\_body().

#### 8.12.4.12 void jeod::RadiationThirdBody::set\_name ( std::string *name\_in* ) [inline]

Setter for the name.

Definition at line 254 of file radiation\_third\_body.hh.

References name.

#### 8.12.4.13 bool jeod::RadiationThirdBody::test\_for\_state\_update ( double *real\_time* ) [protected]

Tests for necessity of updating third body state, and calls appropriate update method (polymorphic) if needed.

**Parameters**

<i>in</i>	<i>real_time</i>	Current time Units: s
-----------	------------------	--------------------------

Definition at line 478 of file radiation\_third\_body.cc.

References force\_state\_update, last\_update\_time, update\_interval, and update\_third\_body\_state().

Referenced by process\_third\_body().

#### 8.12.4.14 bool jeod::RadiationThirdBody::update\_third\_body\_state ( void ) [protected],[virtual]

Updates the state of the Third Body.

Because the ThirdBody may be associated with multiple vehicles, and because its state typically changes much more slowly than the vehicle anyway, it is not always necessary to update the ThirdBodyState.

Definition at line 502 of file radiation\_third\_body.cc.

References active, d\_source\_to\_third, jeod::RadiationSource::inertial\_frame\_ptr, jeod::RadiationMessages::invalid\_setup\_error, local\_frame\_ptr, name, primary\_source\_ptr, source\_to\_third\_hat\_inrtl, and source\_to\_third\_inrtl.

Referenced by test\_for\_state\_update().

### 8.12.5 Friends And Related Function Documentation

#### 8.12.5.1 void init\_attrjeod\_\_RadiationThirdBody ( ) [friend]

#### 8.12.5.2 friend class InputProcessor [friend]

Definition at line 86 of file radiation\_third\_body.hh.

### 8.12.6 Field Documentation

#### 8.12.6.1 bool jeod::RadiationThirdBody::active

Model on/off flag.

trick\_units(-)



Definition at line 124 of file radiation\_third\_body.hh.

Referenced by jeod::RadiationPressure::add\_third\_body(), calculate\_shadow(), initialize(), process\_third\_body(), and update\_third\_body\_state().

#### 8.12.6.2 bool jeod::RadiationThirdBody::added\_to\_model [protected]

Flag to indicate whether body has already been added to a model.

trick\_units(–)

Definition at line 156 of file radiation\_third\_body.hh.

Referenced by get\_added\_to\_model(), and set\_added\_to\_model().

#### 8.12.6.3 double jeod::RadiationThirdBody::d\_source\_to\_third [protected]

Magnitude of source\_to\_third.

trick\_units(m)

Definition at line 226 of file radiation\_third\_body.hh.

Referenced by calculate\_shadow(), and update\_third\_body\_state().

#### 8.12.6.4 bool jeod::RadiationThirdBody::force\_state\_update

Flag to indicate whether to enforce an update to the third-body body-state.

Default: true Self-resets to false after each use.trick\_units(–)

Definition at line 114 of file radiation\_third\_body.hh.

Referenced by test\_for\_state\_update().

#### 8.12.6.5 double jeod::RadiationThirdBody::illum\_factor [protected]

Value between 0 and 1 representing the fraction of possible flux that is actually incident after shadowing effects.

trick\_units(–)

Definition at line 167 of file radiation\_third\_body.hh.

Referenced by calculate\_shadow(), and process\_third\_body().

#### 8.12.6.6 bool jeod::RadiationThirdBody::initialized [protected]

Flag to indicate that initialization has been complete.

trick\_units(–)

Definition at line 161 of file radiation\_third\_body.hh.

Referenced by calculate\_shadow(), initialize(), and process\_third\_body().

#### 8.12.6.7 double jeod::RadiationThirdBody::last\_update\_time [protected]

Time at which the third body state was last updated.

trick\_units(s)

Definition at line 172 of file radiation\_third\_body.hh.

Referenced by test\_for\_state\_update().

**8.12.6.8   RefFrame\* jeod::RadiationThirdBody::local\_frame\_ptr**

Pointer to the local reference frame, for determining position of this object.

trick\_units(-)

Definition at line 147 of file radiation\_third\_body.hh.

Referenced by initialize(), and update\_third\_body\_state().

**8.12.6.9   std::string jeod::RadiationThirdBody::name**

Name of planet.

trick\_units(-)

Definition at line 119 of file radiation\_third\_body.hh.

Referenced by jeod::RadiationPressure::add\_third\_body(), calculate\_shadow(), initialize(), process\_third\_body(), set\_name(), and update\_third\_body\_state().

**8.12.6.10   double jeod::RadiationThirdBody::output\_flux[3]**

Calculated value.

Set only in derived class RadiationReflectingThirdBody.trick\_units(-)

Definition at line 141 of file radiation\_third\_body.hh.

Referenced by RadiationThirdBody().

**8.12.6.11   Planet\* jeod::RadiationThirdBody::planet\_link   [protected]**

Pointer to the associated Planet object.

trick\_units(-)

Definition at line 178 of file radiation\_third\_body.hh.

Referenced by initialize().

**8.12.6.12   RadiationSource\* jeod::RadiationThirdBody::primary\_source\_ptr**

Pointer to the primary illumination source.

trick\_units(-)

Definition at line 102 of file radiation\_third\_body.hh.

Referenced by calculate\_shadow(), initialize(), and update\_third\_body\_state().

**8.12.6.13   double jeod::RadiationThirdBody::r\_minus   [protected]**

The value (radius - R\_source)

trick\_units(-)

Definition at line 188 of file radiation\_third\_body.hh.

Referenced by calculate\_shadow(), and initialize().

**8.12.6.14** `double jeod::RadiationThirdBody::r_par` `[protected]`

Component of vector from [RadiationThirdBody](#) to vehicle that is parallel to vector from primary source to [RadiationThirdBody](#).

`trick_units(m)`

Definition at line 201 of file `radiation_third_body.hh`.

Referenced by `calculate_shadow()`.

**8.12.6.15** `double jeod::RadiationThirdBody::r_perp` `[protected]`

Component of vector from [RadiationThirdBody](#) to vehicle that is perpendicular to vector from primary source to [RadiationThirdBody](#).

`trick_units(-)`

Definition at line 207 of file `radiation_third_body.hh`.

Referenced by `calculate_shadow()`.

**8.12.6.16** `double jeod::RadiationThirdBody::r_plus` `[protected]`

The value (radius + R\_source)

`trick_units(-)`

Definition at line 183 of file `radiation_third_body.hh`.

Referenced by `calculate_shadow()`, and `initialize()`.

**8.12.6.17** `double jeod::RadiationThirdBody::r_ratio` `[protected]`

The ratio (radius / R\_source)

`trick_units(-)`

Definition at line 193 of file `radiation_third_body.hh`.

Referenced by `calculate_shadow()`, and `initialize()`.

**8.12.6.18** `double jeod::RadiationThirdBody::radius`

Radius of [RadiationThirdBody](#).

Note - this is set automatically if RTB is a planet, but must be set manually if RTB is a `DynBody`.`trick_units(m)`

Definition at line 135 of file `radiation_third_body.hh`.

Referenced by `calculate_shadow()`, and `initialize()`.

**8.12.6.19** `ShadowGeometry jeod::RadiationThirdBody::shadow_geometry`

Flag indicating cylindrical / conical shadow geometry.

`trick_units(-)`

Definition at line 107 of file `radiation_third_body.hh`.

Referenced by `calculate_shadow()`, and `convert_shadow_from_int()`.

**8.12.6.20** `double jeod::RadiationThirdBody::source_to_third_hat_inrtl[3]` `[protected]`

Unit vector of `source_to_third`.

`trick_units(-)`

Definition at line 231 of file `radiation_third_body.hh`.

Referenced by `calculate_shadow()`, `RadiationThirdBody()`, and `update_third_body_state()`.

**8.12.6.21** `double jeod::RadiationThirdBody::source_to_third_inrtl[3]` `[protected]`

Vector from the primary source to the [RadiationThirdBody](#) in inertial RF.

`trick_units(m)`

Definition at line 221 of file `radiation_third_body.hh`.

Referenced by `calculate_shadow()`, `RadiationThirdBody()`, and `update_third_body_state()`.

**8.12.6.22** `double jeod::RadiationThirdBody::third_to_cg_inrtl[3]` `[protected]`

Vector from [RadiationThirdBody](#) to vehicle center of gravity, in inertial RF.

`trick_units(m)`

Definition at line 213 of file `radiation_third_body.hh`.

Referenced by `calculate_shadow()`, and `RadiationThirdBody()`.

**8.12.6.23** `double jeod::RadiationThirdBody::update_interval`

Time interval between third body state updates.

`trick_units(s)`

Definition at line 129 of file `radiation_third_body.hh`.

Referenced by `test_for_state_update()`.

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

- [radiation\\_third\\_body.hh](#)
- [radiation\\_third\\_body.cc](#)

## Chapter 9

# File Documentation

### 9.1 flat\_plate\_radiation\_facet.cc File Reference

Define member functions for class FlatPlateRadiationFacet.

```
#include "utils/math/include/vector3.hh"
#include "utils/message/include/message_handler.hh"
#include "utils/surface_model/include/flat_plate.hh"
#include "../include/flat_plate_radiation_facet.hh"
#include "../include/radiation_messages.hh"
#include "../include/radiation_third_body.hh"
```

#### Namespaces

- [jeod](#)

*Namespace jeod.*

#### 9.1.1 Detailed Description

Define member functions for class FlatPlateRadiationFacet.

Definition in file [flat\\_plate\\_radiation\\_facet.cc](#).

### 9.2 flat\_plate\_radiation\_facet.hh File Reference

Individual facets for use with rad environment interaction models.

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

#### Data Structures

- class [jeod::FlatPlateRadiationFacet](#)

*A flat plate facet to be used for radiation interaction.*

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.2.1 Detailed Description

Individual facets for use with rad environment interaction models.

Definition in file [flat\\_plate\\_radiation\\_facet.hh](#).

## 9.3 flat\_plate\_radiation\_factory.cc File Reference

Factory that creates a FlatPlateRadiationFacet, from a facet model.

```
#include <cstdint>
#include <typeinfo>
#include "utils/surface_model/include/flat_plate_thermal.hh"
#include "utils/memory/include/jeod_alloc.hh"
#include "utils/message/include/message_handler.hh"
#include "../include/flat_plate_radiation_factory.hh"
#include "../include/radiation_params.hh"
#include "../include/flat_plate_radiation_facet.hh"
#include "../include/radiation_messages.hh"
```

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.3.1 Detailed Description

Factory that creates a FlatPlateRadiationFacet, from a facet model.

Definition in file [flat\\_plate\\_radiation\\_factory.cc](#).

## 9.4 flat\_plate\_radiation\_factory.hh File Reference

Factory that creates an interaction facet, for a specific environment interaction model, from a facet model.

```
#include "utils/sim_interface/include/jeod_class.hh"
#include "utils/surface_model/include/interaction_facet_factory.hh"
#include "flat_plate_radiation_facet.hh"
```

## Data Structures

- class [jeod::FlatPlateRadiationFactory](#)

*The factory for building flat plate radiation facets.*

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.4.1 Detailed Description

Factory that creates an interaction facet, for a specific environment interaction model, from a facet model.

Definition in file [flat\\_plate\\_radiation\\_factory.hh](#).

## 9.5 radiation\_base\_facet.cc File Reference

Define member functions for class RadiationBaseFacet.

```
#include "utils/math/include/vector3.hh"
#include "utils/message/include/message_handler.hh"
#include "../include/radiation_base_facet.hh"
#include "../include/radiation_messages.hh"
#include "../include/radiation_third_body.hh"
```

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.5.1 Detailed Description

Define member functions for class RadiationBaseFacet.

Definition in file [radiation\\_base\\_facet.cc](#).

## 9.6 radiation\_base\_facet.hh File Reference

Individual facets for use with radiation environment interaction models.

```
#include "utils/sim_interface/include/jeod_class.hh"
#include "utils/surface_model/include/interaction_facet.hh"
#include "interactions/thermal_rider/include/thermal_facet_rider.hh"
```

## Data Structures

- class [jeod::RadiationBaseFacet](#)

*Generic type of facet for radiation pressure.*

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.6.1 Detailed Description

Individual facets for use with radiation environment interaction models.

Definition in file [radiation\\_base\\_facet.hh](#).

## 9.7 radiation\_default\_surface.cc File Reference

Default surface for use with Radiation Pressure interaction model.

```
#include "dynamics/dyn_body/include/dyn_body.hh"
#include "interactions/thermal_rider/include/thermal_facet_rider.hh"
#include "utils/math/include/vector3.hh"
#include "utils/message/include/message_handler.hh"
#include "../include/radiation_default_surface.hh"
#include "../include/radiation_messages.hh"
#include "../include/radiation_third_body.hh"
```

### Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.7.1 Detailed Description

Default surface for use with Radiation Pressure interaction model.

Definition in file [radiation\\_default\\_surface.cc](#).

## 9.8 radiation\_default\_surface.hh File Reference

Individual facets for use with radiation environment interaction models.

```
#include <string>
#include <utility>
#include "utils/sim_interface/include/jeod_class.hh"
#include "interactions/thermal_rider/include/thermal_facet_rider.hh"
#include "radiation_base_facet.hh"
```

### Data Structures

- class [jeod::RadiationDefaultSurface](#)

*The default spherical surface for radiation pressure.*

### Namespaces

- [jeod](#)

*Namespace jeod.*



### 9.8.1 Detailed Description

Individual facets for use with radiation environment interaction models.

Definition in file [radiation\\_default\\_surface.hh](#).

## 9.9 radiation\_facet.cc File Reference

Individual facets for use with Radiation Pressure interaction models.

```
#include "utils/math/include/vector3.hh"
#include "utils/surface_model/include/facet.hh"
#include "interactions/thermal_rider/include/thermal_facet_rider.hh"
#include "utils/message/include/message_handler.hh"
#include "../include/radiation_facet.hh"
#include "../include/radiation_params.hh"
#include "../include/radiation_messages.hh"
```

### Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.9.1 Detailed Description

Individual facets for use with Radiation Pressure interaction models.

Definition in file [radiation\\_facet.cc](#).

## 9.10 radiation\_facet.hh File Reference

Individual facets for use with radiation environment interaction models.

```
#include "utils/sim_interface/include/jeod_class.hh"
#include "utils/surface_model/include/interaction_facet.hh"
#include "interactions/thermal_rider/include/thermal_facet_rider.hh"
#include "radiation_base_facet.hh"
#include "utils/surface_model/include/facet.hh"
```

### Data Structures

- class [jeod::RadiationFacet](#)

*Generic type of facet for radiation pressure.*

### Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.10.1 Detailed Description

Individual facets for use with radiation environment interaction models.

Definition in file [radiation\\_facet.hh](#).

## 9.11 radiation\_messages.cc File Reference

Implement the class RadiationMessages.

```
#include "../include/radiation_messages.hh"
```

### Namespaces

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

### Macros

- #define [PATH](#) "interactions/radiation\_pressure/"

### 9.11.1 Detailed Description

Implement the class RadiationMessages.

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

## 9.12 radiation\_messages.hh File Reference

Define the class RadiationMessages, the class that specifies the message IDs used in the Radiation model.

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

### Data Structures

- class [jeod::RadiationMessages](#)  
*Provides error messages.*

### Namespaces

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

### 9.12.1 Detailed Description

Define the class RadiationMessages, the class that specifies the message IDs used in the Radiation model.

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

## 9.13 radiation\_params.cc File Reference

A virtual base class for radiation facet parameters, used to create interaction facets for radiation in the Interaction-SurfaceFactorys.

```
#include "../include/radiation_params.hh"
```

### Namespaces

- [jeod](#)

*Namespace jeod.*

#### 9.13.1 Detailed Description

A virtual base class for radiation facet parameters, used to create interaction facets for radiation in the Interaction-SurfaceFactorys.

Definition in file [radiation\\_params.cc](#).

## 9.14 radiation\_params.hh File Reference

A virtual base class for radiation facet parameters, used to create interaction facets for radiation in the Interaction-SurfaceFactorys.

```
#include "utils/sim_interface/include/jeod_class.hh"  
#include "interactions/thermal_rider/include/thermal_params.hh"  
#include "utils/surface_model/include/facet_params.hh"
```

### Data Structures

- class [jeod::RadiationParams](#)

*Provides a parameter list to each facet, based on the facet material properties.*

### Namespaces

- [jeod](#)

*Namespace jeod.*

#### 9.14.1 Detailed Description

A virtual base class for radiation facet parameters, used to create interaction facets for radiation in the Interaction-SurfaceFactorys.

Definition in file [radiation\\_params.hh](#).

## 9.15 radiation\_pressure.cc File Reference

Calculation of force and torque due to radiation pressure.

```
#include <cstdint>
#include "dynamics/dyn_manager/include/dyn_manager.hh"
#include "utils/math/include/vector3.hh"
#include "utils/message/include/message_handler.hh"
#include "utils/memory/include/jeod_alloc.hh"
#include "interactions/thermal_rider/include/thermal_facet_rider.hh"
#include "../include/radiation_pressure.hh"
#include "../include/radiation_third_body.hh"
#include "../include/radiation_source.hh"
#include "../include/radiation_messages.hh"
```

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.15.1 Detailed Description

Calculation of force and torque due to radiation pressure.

Definition in file [radiation\\_pressure.cc](#).

## 9.16 radiation\_pressure.hh File Reference

Radiation pressure top-level definition.

```
#include "utils/container/include/pointer_vector.hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include "interactions/thermal_rider/include/thermal_model_rider.hh"
#include "radiation_source.hh"
#include "radiation_surface.hh"
#include "radiation_default_surface.hh"
```

## Data Structures

- class [jeod::RadiationPressure](#)

*Radiation pressure top-level definition.*

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.16.1 Detailed Description

Radiation pressure top-level definition.

Definition in file [radiation\\_pressure.hh](#).

## 9.17 radiation\_pressure\_\_default\_surface.cc File Reference

Calculation of force and torque due to radiation pressure.

```
#include "dynamics/dyn_manager/include/dyn_manager.hh"
#include "utils/math/include/vector3.hh"
#include "interactions/thermal_rider/include/thermal_model_rider.hh"
#include "../include/radiation_pressure.hh"
#include "../include/radiation_default_surface.hh"
#include "../include/radiation_third_body.hh"
#include "../include/radiation_source.hh"
```

### Namespaces

- [jeod](#)

*Namespace jeod.*

#### 9.17.1 Detailed Description

Calculation of force and torque due to radiation pressure.

Definition in file [radiation\\_pressure\\_\\_default\\_surface.cc](#).

## 9.18 radiation\_pressure\_\_surface\_model.cc File Reference

Calculation of force and torque due to radiation pressure.

```
#include "dynamics/dyn_manager/include/dyn_manager.hh"
#include "utils/math/include/vector3.hh"
#include "interactions/thermal_rider/include/thermal_model_rider.hh"
#include "../include/radiation_pressure.hh"
#include "../include/radiation_surface.hh"
#include "../include/radiation_third_body.hh"
#include "../include/radiation_source.hh"
```

### Namespaces

- [jeod](#)

*Namespace jeod.*

#### 9.18.1 Detailed Description

Calculation of force and torque due to radiation pressure.

Definition in file [radiation\\_pressure\\_\\_surface\\_model.cc](#).

## 9.19 radiation\_source.cc File Reference

Definition of methods associated with Primary Sources.

```
#include <cstdint>
#include "dynamics/dyn_manager/include/dyn_manager.hh"
#include "utils/math/include/vector3.hh"
#include "utils/memory/include/jeod_alloc.hh"
#include "utils/message/include/message_handler.hh"
#include "environment/planet/include/planet.hh"
#include "utils/ref_frames/include/ref_frame.hh"
#include "../include/radiation_source.hh"
#include "../include/radiation_messages.hh"
```

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.19.1 Detailed Description

Definition of methods associated with Primary Sources.

Definition in file [radiation\\_source.cc](#).

## 9.20 radiation\_source.hh File Reference

Radiation pressure parameter and variable definitions.

```
#include <string>
#include <utility>
#include "utils/sim_interface/include/jeod_class.hh"
```

## Data Structures

- class [jeod::RadiationSource](#)

*Provides information on the source of the incident radiation.*

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.20.1 Detailed Description

Radiation pressure parameter and variable definitions.

Definition in file [radiation\\_source.hh](#).

## 9.21 radiation\_surface.cc File Reference

Vehicle surface model for Radiation Pressure model.

```
#include <cstdint>
#include "dynamics/dyn_body/include/dyn_body.hh"
#include "utils/math/include/vector3.hh"
#include "utils/memory/include/jeod_alloc.hh"
#include "utils/message/include/message_handler.hh"
#include "utils/surface_model/include/interaction_facet_factory.hh"
#include "utils/surface_model/include/interaction_facet.hh"
#include "utils/surface_model/include/facet.hh"
#include "../include/radiation_facet.hh"
#include "../include/radiation_surface.hh"
#include "../include/radiation_messages.hh"
```

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.21.1 Detailed Description

Vehicle surface model for Radiation Pressure model.

Definition in file [radiation\\_surface.cc](#).

## 9.22 radiation\_surface.hh File Reference

Vehicle surface model for general environment interaction models.

```
#include "utils/sim_interface/include/jeod_class.hh"
#include "utils/surface_model/include/interaction_surface.hh"
#include "radiation_facet.hh"
```

## Data Structures

- class [jeod::RadiationSurface](#)

*The surface of the vehicle that interacts with the incident flux.*

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.22.1 Detailed Description

Vehicle surface model for general environment interaction models.

Definition in file [radiation\\_surface.hh](#).

## 9.23 radiation\_surface\_factory.cc File Reference

Factory that creates an interaction surface, for a specific environment interaction model, from a surface model.

```
#include <cstdint>
#include "utils/message/include/message_handler.hh"
#include "../include/radiation_surface_factory.hh"
#include "../include/radiation_params.hh"
#include "../include/radiation_messages.hh"
```

### Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.23.1 Detailed Description

Factory that creates an interaction surface, for a specific environment interaction model, from a surface model.

Definition in file [radiation\\_surface\\_factory.cc](#).

## 9.24 radiation\_surface\_factory.hh File Reference

Factory that creates an interaction surface, for a specific environment interaction model, from a surface model.

```
#include "utils/sim_interface/include/jeod_class.hh"
#include "utils/surface_model/include/interaction_surface_factory.hh"
#include "flat_plate_radiation_factory.hh"
```

### Data Structures

- class [jeod::RadiationSurfaceFactory](#)

*The factory for creating Radiation Surfaces.*

### Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.24.1 Detailed Description

Factory that creates an interaction surface, for a specific environment interaction model, from a surface model.

Definition in file [radiation\\_surface\\_factory.hh](#).

## 9.25 radiation\_third\_body.cc File Reference

Provides the functionality associated with RadiationThirdBodys.



```
#include <cstdint>
#include "dynamics/dyn_manager/include/dyn_manager.hh"
#include "environment/planet/include/planet.hh"
#include "utils/math/include/vector3.hh"
#include "utils/message/include/message_handler.hh"
#include "../include/radiation_third_body.hh"
#include "../include/radiation_source.hh"
#include "../include/radiation_messages.hh"
```

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.25.1 Detailed Description

Provides the functionality associated with RadiationThirdBodys.

Definition in file [radiation\\_third\\_body.cc](#).

## 9.26 radiation\_third\_body.hh File Reference

Define the class RadiationThirdBody.

```
#include <string>
#include <utility>
#include "utils/sim_interface/include/jeod_class.hh"
```

## Data Structures

- class [jeod::RadiationThirdBody](#)

*Provide information on bodies that may cause shadowing or reflected illumination.*

## Namespaces

- [jeod](#)

*Namespace jeod.*

### 9.26.1 Detailed Description

Define the class RadiationThirdBody.

Definition in file [radiation\\_third\\_body.hh](#).

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