**F\_gravity\_descent**

**Calling Syntax:** F = F\_gravity\_descent(edl\_system,planet)

**Description:** This function computes the gravitational force acting on the EDL system, in the direction of the rover translation.

**Input Arguments:**

edl\_system struct Data structure containing EDL system parameters

planet struct Data structure containing planet gravity parameter

**Output Arguments:**

F scalar Force [N]

**edl\_dynamics**

**Calling Syntax:** dydt = edl\_dynamics(t, y, edl\_system, planet)

**Description:** This function computes the derivative of the state vector for the edl\_system given its current state.

**Input Arguments:**

t scalar Time sample [s]

y 2x1 array Array of dependent variables. First element is edl\_system velocity [m/s]

and second element is edl\_system position [m]

edl\_system struct Data structure containing EDL system parameters

planet stuct Data structure containing planet definition

**Output Arguments:**

dydt 2x1 array First derivatives of state vectors. First element is edl\_system

acceleration [m/s^2] and second element is edl\_system velocity [m/s]

**edl\_events**

**Calling Syntax:** [value, isterminal, direction] = edl\_events(t, y, edl\_system, mission\_events)

**Description:** This function defines events that occur in EDL system simulation such as reached altitudes, reached speed, reached position, and rover touching the surface.

**Input Arguments:**

t scalar Time sample [s]

y 2x1 array Array of dependent variables. First element is edl\_system

velocity [m/s] and second element is edl\_system position [m]

edl\_system struct Data structure containing EDL system parameters

mission\_events struct Data structure containing particular EDL altitude events

**Output Arguments:**

value array Series of values with various altitudes, position and velocities

isterminal N-elem. Array Array of ones depending on the output of value

direction array Array of -1

**F\_buoyancy\_descent**

**Calling Syntax:** F = F\_buoyancy\_descent(edl\_system, planet, altitude)

**Description:** This function computes the net buoyancy force, in Newtons, acting on the EDL system.

**Input Arguments:**

edl\_system struct Data structure containing EDL system parameters

planet struct Data structure containing planet definition

altitude scalar Altitude at a current point [m]

**Output Arguments:**

F scalar Net buoyancy forces [N]

**F\_drag\_descent**

**Calling Syntax:** F = F\_drag\_descent(edl\_system, planet, altitude, velocity)

**Description:** This function computes the component of force due to drag.

**Input Arguments:**

edl\_system struct Data structure containing EDL system parameters

planet stuct Data structure containing planet definition

altitude scalar Altitude at a current point [m]

velocity scalar Velocity at current point [m/s]

**Output Arguments:**

F scalar Net drag forces [N]

**get\_local\_atm\_properties**

**Calling Syntax:** [density, temperature, pressure] = get\_local\_atm\_properties(planet, altitude)

**Description:** This function returns local atmospheric properties at a given altitude

**Input Arguments:**

planet stuct Data structure containing planet definition

altitude scalar Altitude at current point [m]

**Output Arguments:**

density scalar Density at current pressure [kg/m^3]

temperature scalar Temperature at current altitude [C]

pressure scalar Pressure at current altitude [KPa]

**get\_mass\_edl**

**Calling Syntax: get\_mass\_edl**

**Description:** This function computes the edl\_system mass in kilograms

**Input Arguments:**

edl\_system struct Data structure containing EDL system parameters

**Output Arguments:**

m scalar edl\_system mass [kg]