```
'''             ALL VARIABLES AVAILABLE TO PLOT FROM FLIGHT DATA
VARIABLE NAME           VARIABLE DESCRIPTION
Ahrs1_Pitch             = Pitch Angle
Ahrs1_Roll              = Roll Angle
Ahrs1_VertAcc           = Vertical Acceleration
Ahrs1_aHdgAcc           = Along Heading Accel
Ahrs1_bLatAcc           = Body Lat Acceleration
Ahrs1_bLongAcc          = Body Lon Acceleration
Ahrs1_bNormAcc          = Body Normal Acceleration
Ahrs1_bPitchRate        = Body Pitch Rate
Ahrs1_bRollRate         = Body Roll Rate
Ahrs1_bYawRate          = Body Yaw Rate
Ahrs1_xHdgAcc           = Cross Heading Acceleration
Dadc1_altRate           = Altitude Rate
Dadc1_bcAlt             = Barometric Altitude
Dadc1_cas               = Computed Airspeed
Dadc1_mach              = Mach
Dadc1_sat               = Satic Air Temperature
Dadc1_tas               = True Air Speed
Dadc1_tat               = True Air Temperature
Gps_lat                 = GPS Latitude
Gps_long                = GPS Longitude
column_fe               = Force on Elevator Control Wheel
delta_a                 = Deflection Aileron
delta_e                 = Deflection Elevator
delta_r                 = Deflection Rudder
elevator_dte            = Deflection of Elevator Trim
lh_engine_FMF           = Left Engine Fuel Mass Flow
lh_engine_FU            = Left Engine Fuel Used
rh_engine_FMF           = Right Engine Fuel Mass Flow
rh_engine_FU            = Right Engine Fuel Used
time                    = Time
vane_AOA                = Angle of Attack
'''

from data_extractor import data_extractor #data_extractor()
from fuel_calc import fuel_calc #fuel_calc(initial_l, initial_r, fuel_lef, fuel_rig, timedata, time)
from map_plot import map_plot #map_plot(timedata, t0, t1, gps_lon, gps_lat, alt)
from response_plots import response_plot_data, state_space_plot, compare_plot, actual_plot #response_plot(variable1, variable2, time0, time1)
from cg_calculator import cg_calculator #(x_coord,m_lt,m_rt)
from postflightdata import post_flight_data
from flight_parameters import flight_parameters
import matplotlib.pyplot as plt

''' Getting the flight data from both sources'''
flightdata = data_extractor()
testdata = post_flight_data()
# (h,m,theta,alpha,tdata,t)
''' Getting the time data from the flight data '''
timedata = flightdata.get('time')
t0 = (48*60)+3
t1 = 'end'

''' Example of plotting two variables against eachother '''
variable1 = flightdata.get('time')
variable2 = flightdata.get('delta_a')
alt = flightdata.get('Dadc1_bcAlt')

#response_plot_data(timedata, variable1, variable2, t0, t1)

#''' Example of a map plot '''
gps_lon = flightdata.get('Gps_long')
gps_lat = flightdata.get('Gps_lat')
alt = flightdata.get('Dadc1_bcAlt')
#map_plot(timedata, t0, t1, gps_lon, gps_lat, alt)
#
''' Calculating the fuel left in the tanks '''
fuel_used_l = flightdata.get('lh_engine_FU')
fuel_used_r = flightdata.get('rh_engine_FU')
initial_fuel_l = 4050/2
initial_fuel_r = 4050/2
fuel_mass = fuel_calc(initial_fuel_l, initial_fuel_r, fuel_used_l, fuel_used_r, testdata[-3])

''' Getting flight parameters AND SETTING TIMES FOR THE INITIAL INPUTS'''
flightparameters = flight_parameters(flightdata.get('Dadc1_bcAlt'), fuel_mass[2], flightdata.get('Ahrs1_Pitch'), flightdata.get('vane_AOA'), t
print('m = ' + str(flightparameters[1]))
print('rho = ' + str(flightparameters[4]))
print('v = ' + str(flightparameters[5]))
```

```
''' Plotting Numerical Model Simulations '''
state_space_plot('phugoid', flightparameters)
#state_space_plot('short', flightparameters)
#state_space_plot('dutch', flightparameters)
#state_space_plot('spiral', flightparameters)
#state_space_plot('aperiodic', flightparameters)



''' Plotting Actual Flight Data '''
''' Comparing state space symmetrical and actual '''
variable1 = flightdata.get('time')
variable2 = flightdata.get('delta_e')
variable3 = flightdata.get('vane_AOA')
variable4 = flightdata.get('Ahrs1_Pitch')
variable5 = flightdata.get('Ahrs1_bPitchRate')
variable6 = flightdata.get('Ahrs1_Roll')
#actual_plot(timedata, variable1, variable2, variable3, variable4, variable5, variable6, 2891-1.4,  2891+125-1.4, flightparameters, 'phugoid')
#actual_plot(timedata, variable1, variable2, variable3, variable4, variable5, variable6, 3041.5, 3049.5, flightparameters, 'short')

''' Comparing state space asymmetrical and actual '''
variable1 = flightdata.get('time')
variable2 = flightdata.get('Ahrs1_bYawRate')
variable3 = flightdata.get('delta_r')
variable4 = flightdata.get('Ahrs1_bRollRate')
variable5 = flightdata.get('Ahrs1_bYawRate')
variable6 = flightdata.get('Ahrs1_Roll')
#actual_plot(timedata, variable1, variable2, variable3, variable4, variable5, variable6, 3098.6, 3118.6, flightparameters, 'dutch')
#actual_plot(timedata, variable1, variable2, variable3, variable4, variable5, variable6, 2833.7, 2833.7+8, flightparameters, 'aperiodic')
#actual_plot(timedata, variable1, variable2, variable3, variable4, variable5, variable6, 3220.7, 3220.7+120, flightparameters, 'spiral')



''' Comparing state space symmetrical and actual '''
variable1 = flightdata.get('time')
variable2 = flightdata.get('delta_e')
variable3 = flightdata.get('vane_AOA')
variable4 = flightdata.get('Ahrs1_Pitch')
variable5 = flightdata.get('Ahrs1_bPitchRate')
variable6 = flightdata.get('Ahrs1_Roll')
#compare_plot(timedata, variable1, variable2, variable3, variable4, variable5, variable6, 2891-1.4,  2891+125-1.4, flightparameters, 'phugoid'
#compare_plot(timedata, variable1, variable2, variable3, variable4, variable5, variable6, 3041.5, 3049.5, flightparameters, 'short')

''' Comparing state space asymmetrical and actual '''
variable1 = flightdata.get('time')
variable2 = flightdata.get('Ahrs1_bYawRate')
variable3 = flightdata.get('delta_r')
variable4 = flightdata.get('Ahrs1_bRollRate')
variable5 = flightdata.get('Ahrs1_bYawRate')
variable6 = flightdata.get('Ahrs1_Roll')
#compare_plot(timedata, variable1, variable2, variable3, variable4, variable5, variable6, 3098.6, 3118.6, flightparameters, 'dutch')
#compare_plot(timedata, variable1, variable2, variable3, variable4, variable5, variable6, 2833.7, 2833.7+8, flightparameters, 'aperiodic')
#compare_plot(timedata, variable1, variable2, variable3, variable4, variable5, variable6, 3220.7, 3220.7+120, flightparameters, 'spiral')
```