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Website: www.aero.iitb.ac.in/satlab

Readme file for getOrbitData.py
Attitude Determination and Control Subsystem

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filename

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Date:06 October 2018
This function takes orbital elements and calls sgp_fn, to generate position and velocity of satellite at different time instants.
Input:TT - Total time of the orbit in minutes
MS - Model step time (MODEL_STEP - step size in environmental data in seconds)
MeanMo - Mean motion in revolution per day
Eccen - Eccentricity
Incl_deg - Inclination in degrees
MeanAnamoly_deg - Mean Anamoly in degrees
ArgP - Argument of perigee in degrees
RAAN_deg - Right ascension of ascending node in degrees
sgp_output - timestep, position and velocity in second, meter and meter per second respectively.
getOrbitData_TLE or getOrbitData_OrbitELement give would be used to create this file.
Output: sgp_i_TT$\%g_MS\%g_M Mo\%g_Ecc\%g_Incl\%g_MAnamoly\%g_ArgP\%g_Raan\%g.csv$
example : sgp_i_TT100_MS0.1_MMo16.0582_Ecc0.0086731_Incl72.8435_MAnamoly110.571
_ArgP52.6988_Raan115.969

Note: There are two functions to generate the csv file one is getOrbitData_TLE and another is getOrbitData_OrbitElement. Use getOrbitData_TLE when you want to give the input to the sgp function as Two Line Element (TLE). Since for simulation and testing purposes creating TLE data is quite cumbersome so getOrbitData_OrbitElement function is written to generate sgp files directly from orbital elements. The orbital elements required to csv file of sgp is mentioned in the description of the function below.

getOrbitData_TLE

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Objective of getOrbitData function is to take relevant input such as either TLE or orbital elements from constants_1U.py and fed it to sgp_fn to create trajoctory of satellite. In other words position and velocity of satellite in ECI frame at each timesteps.

Sometime we know TLE data (like from n2yo.com) and want to create orbit in that case this getOrbitData_TLE can be used to call sgp_fn. This function also call TLE2OrbitElements as sgp function require input in terms of orbital elements.TLE2OrbitElements converts TLE into orbital

elements. Input:TT - Total time of the orbit in minutes
MS - Model step time (MODEL_STEP - step size in environmental data in seconds)
dT - time vector from the constant.py
MS - Model step time from the constant.py.
Output:sgp_output.csv (Position and velocity of satellite in ECI frame in m and m/s). It also call filename function for naming of sgp_output in terms of orbital elements of the starting point.

getOrbitData_OrbitElement

Author:Sumit Agrawal
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This function takes orbital elements directly from constants_1U.py and calls sgp_fn to generate orbit.
Input:TT - Total time of the orbit in minutes
MS - Model step time (MODEL_STEP - step size in environmental data in seconds)
MeanMo - Mean motion in revolution per day
Eccen - Eccentricity
Incl_deg - Inclination in degrees
MeanAnamoly_deg - Mean Anamoly in degrees
ArgP - Argument of perigee in degrees
RAAN_deg - Right ascension of ascending node in degrees
sgp_output - timestep, position and velocity in second, meter and meter per second respectively.
Output:sgp_output.csv (Position and velocity of satellite in ECI frame in m and m/s). It also call filename function for naming of sgp_output in terms of orbital elements of the starting point.

References: Two line Element
Celestrak SGP report
Simplified General Perturbation model
N2YO website to get TLE of any space object