ASE 389P.4: Methods of Orbit Determination
Homework 4: Reference Frame Transformations

Assigned: Thursday, March 11, 2021
Due: Tuesday, March 23 @ 12:30pm

With this assignment, you will gain a better understanding of the transformation between an Earth Centered Earth Fixed Earth frame and an Earth Centered Inertial frame

Turn in all results.

Problems

IAU-76/FK5 reduction of position from ECEF (ITRF) to ECI (ICRF)

NOTE: This method uses the IAU-1976 Precession Model & IAU-1980 Theory of Nutation.

Satellite - Galaxy 15

Radius X Y Z ECEF (ITRF) [in kilometers] -28738.3218400000 -30844.0723200000 -6.71800000000000

Gregorian Date (UTC) Year: 2017 Month: December Day: 1 Hour: 0 Minute: 0 Seconds: 48.0003833770752

Julian Date (UTC) 2458088.50055556

Earth Orientation Parameters File Name and Link 'finals.all (IAU1980)'
https://www.iers.org/IERS/EN/DataProducts/EarthOrientationData/eop.html

IERS Leap Seconds File Location (Bulletin C)
https://www.iers.org/IERS/EN/Publications/Bulletins/bulletins.html

'nut80.dat' file provided for nutation parameters 'orthodcm.m' - orthogonal function from Dr. Jah

NOTE: if referencing Vallado for the transformation, know that the Delaunay parameters (Eq 3-82) in the 4th edition were incorrect. Refer to the Errata for correct 1980 values.
https://celestrak.com/software/vallado/ErrataVer4.pdf

NOTE: Appendix H in Born seems to have the method properly laid out as well.

Radius X Y Z ECI (ICRF) [in kilometers] 19165.44514777874 -37549.06140374086 -41.043609948282580