

AE 313/AE 613 Space Flight Mechanics

Assignment 2

Start Date: 25-10-24

Submission Date: 25-11-24

(i) At a given instant, the geocentric equatorial position vector of an earth satellite is

$r_1 = 5644 \mathbf{i} - 2830 \mathbf{j} - 4170 \mathbf{k}$ and twenty minutes later the position is

$r_2 = -2240 \mathbf{i} + 7320 \mathbf{j} - 4980 \mathbf{k}$

Determine the orbital elements, trace the orbit and the ground track for one complete revolution.

(ii) Apply the above concept and design a transfer trajectory from an earth parking orbit to a trajectory that will finally take the space craft to a lunar parking orbit. Estimate the total delta-V requirement to transfer the s/c from earth parking orbit to the required trajectory if we approach it as a lambert problem. Also use this problem to look at the delta-V requirements for a range of time periods for the transfer

Note: Each one of you is expected to approach the design problem by having two different position vectors and a different time duration for the transfer.

Refer Section 5.3 (Lambert Problem), Section 6.8 (Chase Maneuvers) and eg.6.9 for mission design of the lunar transfer