AE 313/AE 613 Space Flight Mechanics

Assignment 2

Start Date: 31-10-22

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

r1= 5644 I- 2830 J- 4170 K and twenty minutes later the position is

r2 = -2240 I +7320 J-4980 K

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

Apply the above concept and design a transfer trajectory from an earth parking orbit to a hyperbolic 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 hyperbolic 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