

Read Chapter 8, All of it

The basic heliocentric transfer orbit for this problem set is a Hohmann transfer orbit from Earth to Mars. We now want to find out how to determine the requirements for an escape burn from Earth and a capture burn at Mars, plus a few other things.

33. Assume that we will launch from an Earth-centered parking orbit of 1.05 DU into the escape orbit that will send us on to Mars via the Hohmann transfer orbit. Calculate the following:
- The ΔV required to enter the correct Earth escape orbit to leave the parking orbit and escape the Earth at just the right speed to enter the Hohmann orbit. (Assume a tangent burn to the parking orbit).
 - The properties of the escape orbit : a, e, h, \mathcal{E} , in Earth canonic units.
34. We desire to end up in a circular orbit about Mars that is 1.2 Mars' radius.
- How far below (or above) Mars' heliocentric orbit must the aphelion of the Hohmann transfer orbit be so that the perimars of the entry orbit is at 1.2 Mars' radii? (In AU and in DU_{mars})?
 - What are the properties of the entry orbit at Mars, a, e, h, \mathcal{E} ? (in Mars canonic units)
 - What is the ΔV required to enter into the parking orbit ($1.2 DU_{\text{Mars}}$)? $(DU/TU)_m$
35. Consider now a flyby of Mars using the same orbit as above, assuming an the aphelion of the transfer orbit is below Mars and that we do an "over-flight" of Mars (go around Mars in the counter-clockwise looking from the top). The perimars distance is the same as in (34), but instead of entering the circular parking orbit, you fly on by and leave Mars.
- Calculate the heliocentric velocity upon leaving Mars (in AU/TU).
 - Calculate the heliocentric flight path angle.
 - Calculate the energy of the heliocentric orbit before and after the Mars flyby.