

Extension of Examples 10.6 and 10.7 from text:

We would like to launch a new communications satellite into geostationary orbit which is located at an altitude of 35,850 km above the Earth's surface. To do this we first need to launch the satellite into an elliptical transfer orbit whose apogee is at the desired final radius. Then once in that orbit we need to boost the satellite into a circular orbit.

1. Assuming that we are launching the satellite ($m_{sat} = 1000$ kg) from the Kennedy Space Center Launch Complex 39A in Cape Canaveral, FL, how much energy must we give the spacecraft to leave the Earth and enter an elliptical orbit with perigee altitude of 1100 km? What is the eccentricity of the orbit? What is the angular momentum? What is the orbital velocity at apogee?
2. How much energy will be required to now transfer to geostationary circular orbit from the apogee of the elliptical transfer orbit?