RESTRICTED THREE BODY PROBLEM

Due Date: 2/13/2014 @ 8:00 am

Continuing with our exploration of ordinary differential equations, here we address the restricted three-body problem in which a massless particle moves in the gravitational field of two massive objects that orbit their mutual center of mass.

- Plot potential $V(x, y, z)$ in 2D and 3D. Determine the location of Lagrange points and study their stability.

- Determine the value of $q = M_2/M_1$ for which L_4 and L_5 become unstable.

- Using your favourite integrator, study the orbits of Trojan and Greek asteroids. How sensitive are the orbits to initial conditions? Are they always stable? Try to find any quasi–periodic orbits.

- Verify that total energy per unit mass of the particle is conserved.

- Plot the shapes of stars for different values of the equipotential $\Omega(\rho)$.