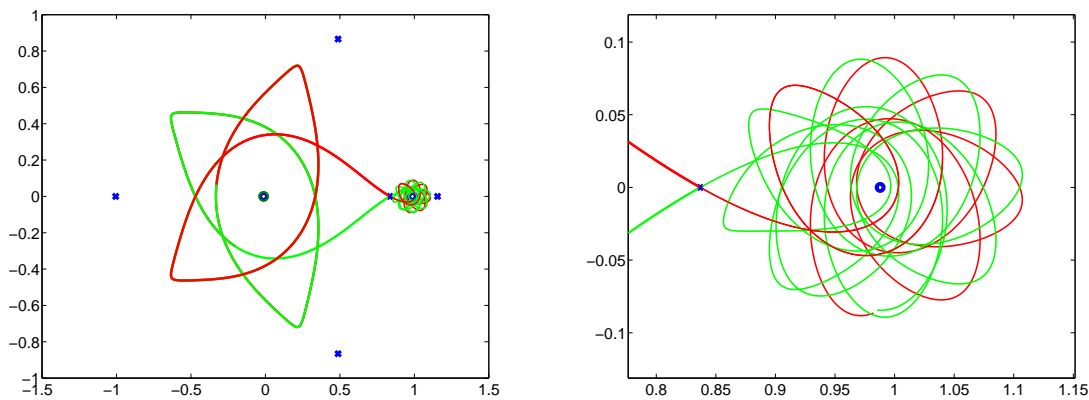


Math 203 CAMCOS Project, Fall 2010:
Mass Transfer and Astrodynamics in Charged, Binary Asteroid Systems
faculty supervisor: **Dr. Jared Maruskin**
project liaison: **Dr. Julie Bellerose, NASA Ames Research Center**

This semester we seek to understand the dynamics of electrically charged, binary asteroid systems. We will first review some classical results in astrodynamics, such as the two body problem, series expansion for the gravitational potential of an arbitrary mass distribution, the restricted three body problem, and the general two body problem. We will use MATLAB to build simulations of these problems as we encounter them.

The problem that we will then explore is the dynamics of two electrically charged, gravitating bodies, such as ones that might be found in a binary asteroid system. An asteroid actually consists of a primary body with tiny particles sitting on its surface. We will seek to understand the conditions for these particles to leave contact with the surface, the ensuing dynamics of these particles in the three body problem, and to quantify mass transfer rates from one primary body to the other, in order to ultimately understand how this mass transfer affects the dynamics of the binary asteroid system. Throughout the project we will focus on numerical simulations and animations of the dynamics we are studying.

Pre-requisites: Linear Algebra, Vector Calculus, Ordinary Differential Equations



Stable and unstable manifolds in the restricted three body problem.