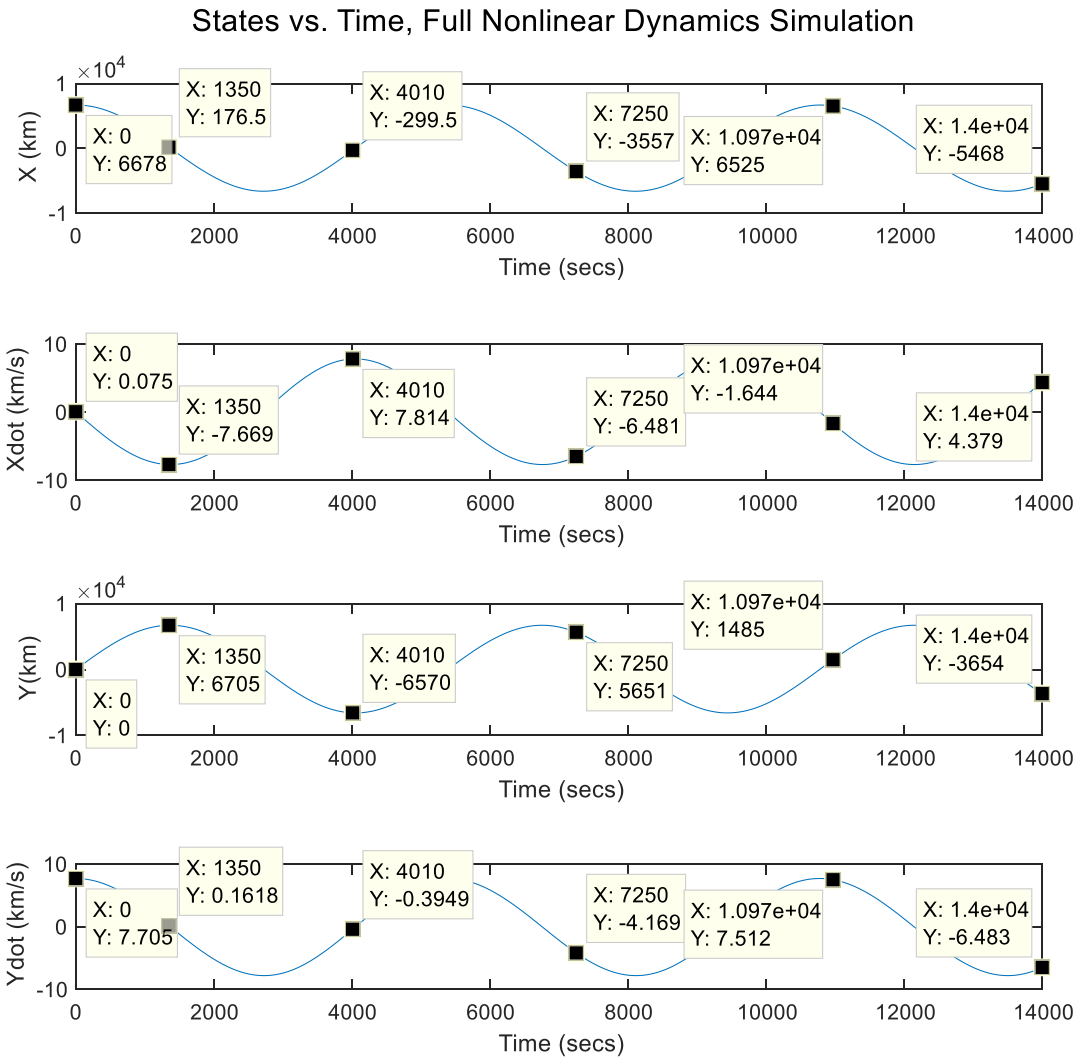
Final Project Part 1 Solution Sketch – Orbit Determination problem

In the following plots, the initial state conditions stated in the problem are perturbed by the vector

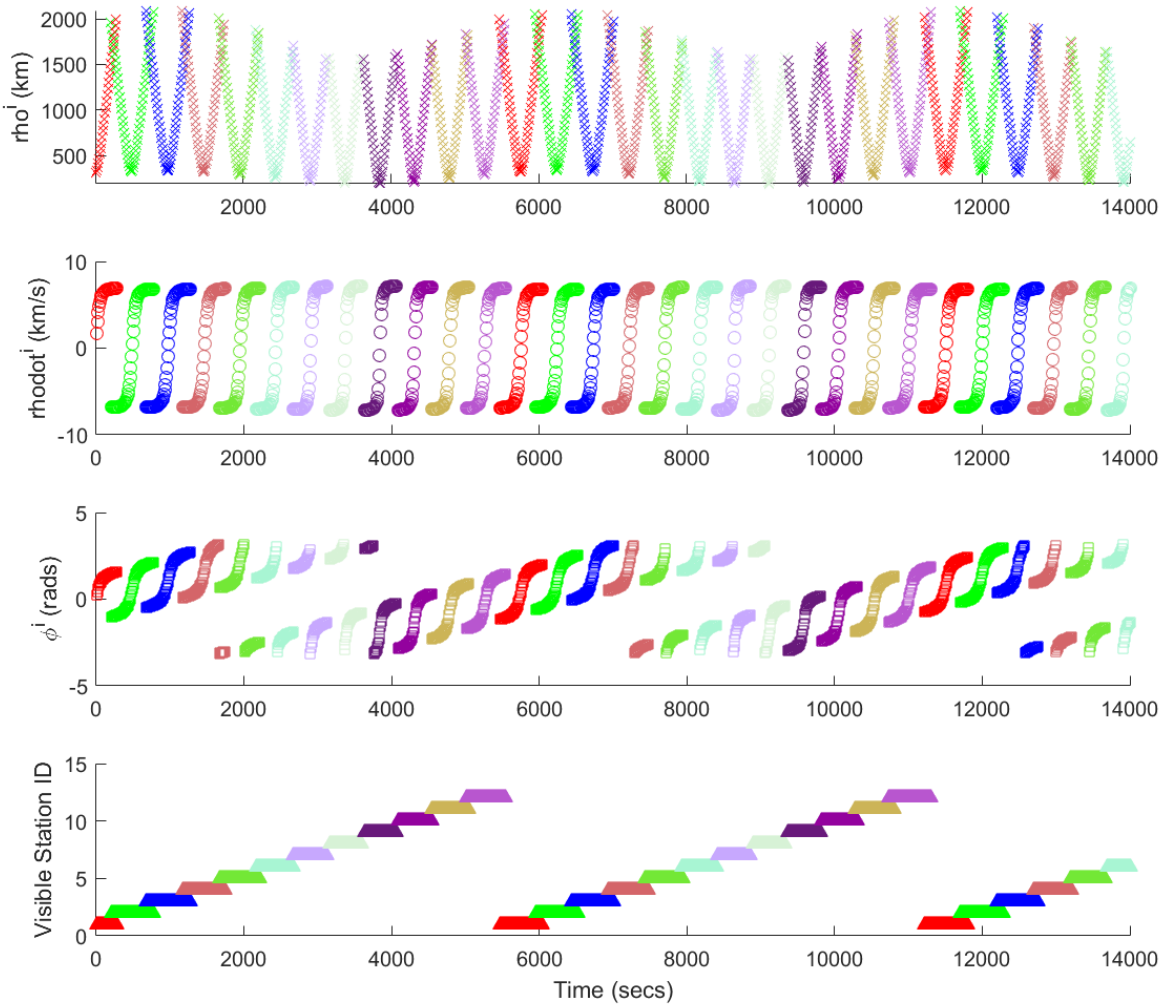
```
perturb_x0 = [0,0.075,0,-0.021];
```

with no control inputs, no process noise inputs, and with no measurement noise outputs simulated.

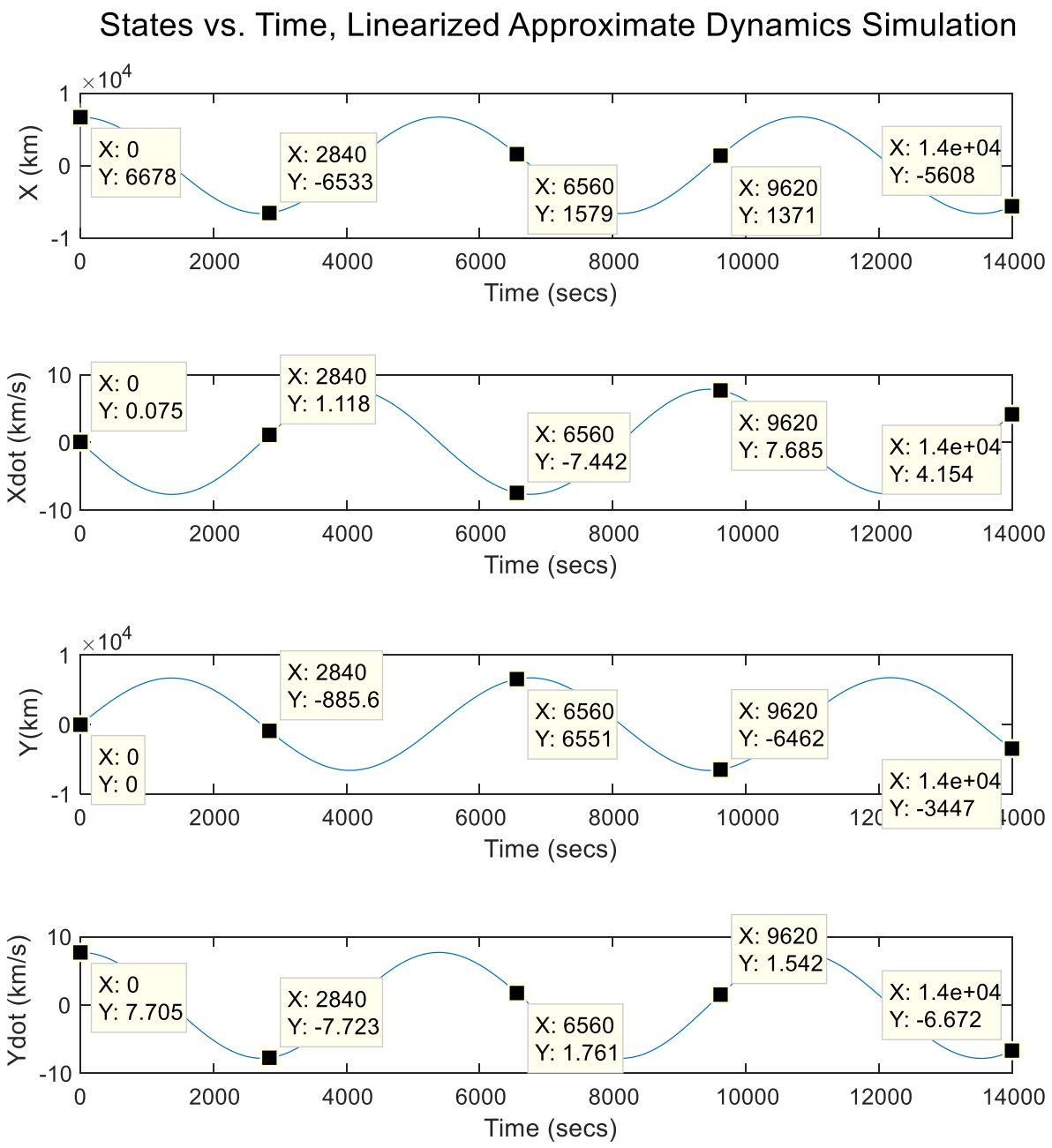
Plot of states vs. time for full nonlinear dynamics (integrated via ode45) for 1400 time steps, followed by plot of resulting measurements according to full nonlinear measurement model (note: zero measurements shown for points along trajectory where spacecraft is not visible by any station):



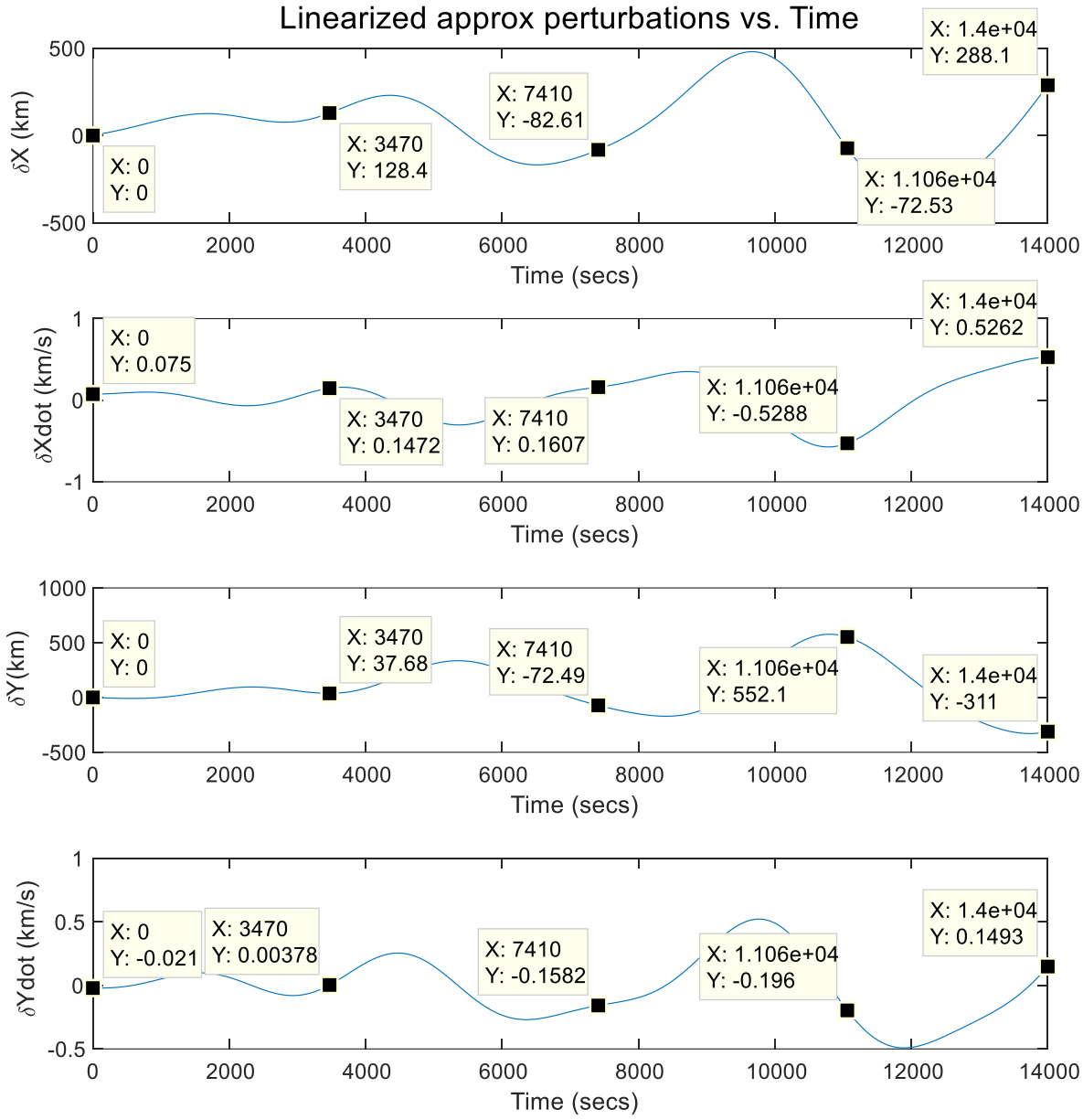
Full Nonlinear Model Data Simulation



Next is a plot of total states vs. time using linearized dynamics model (linearized about nominal noise free state trajectory), followed by plot of corresponding state perturbations (evolving according to linearized dynamics near nominal trajectory) and plot of measurements according to linearized measurement model (which accounts for nominal measurements + linearized perturbations in nominal



measurements – note that visible stations shown here are selected according to the full nonlinear model, since for our purposes this is what a linearized KF/EKF would be using anyway):



Approximate Linearized Model Data Simulation