Statistical Orbit Determination

Lecture 3 – Problem Solution/Linearization

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Recap

- Lecture 2 – Notes posted here
  - Orbital mechanics review
- Problem due today
  - Review of the solution
- Questions
  - Post them to YouTube page
- Additional notes
  - Website revamp

Agenda

- Problem solution
- Linearization
  - State transition matrix
  - Review of linearization

Problem review

Time	0.0	1.0	2.0	3.0	4.0
Range, ρ	7.000000000	8.003905970	8.944271910	9.801147892	10.630145813
Calculated Range, $\hat{\rho}$	9.013878189	9.73203473	10.6004717	11.5815586	12.66688596
X_0	1.5	3.7	5.9	8.1	10.3
Y_0	10.0	10.35	10.4	10.15	9.6
$\dot{X}_0$	2.2	2.2	2.2	2.2	2.2
$\dot{Y}_0$	0.5	0.2	-0.1	-0.4	-0.7
g	0.3	0.3	0.3	0.3	0.3
X_s	1.0	1.0	1.0	1.0	1.0
Y_s	1.0	1.0	1.0	1.0	1.0

Problem solution (1/2)

C:\Users\simps\Documents\GitHub\StatisticalOrbitDetermination\Soln-HW1-SimpsonAerospace\Debug\Soln-HW1-SimpsonAerospace.exe

```
Error for each iteration...
    2.34283
   0.567827
  0.0633679
0.000279296
6.94741e-09
6.94741e-09
Each iterations output...
    0.402014     0.940953      0.99995      1.00007      1.00007 -6.27744e+66
     8.04402      8.02017      8.00025            8            8 -6.27744e+66
      2.1321      2.01002            2      1.99998      1.99998 -6.27744e+66
     1.12213      1.00554     0.999945     0.999982     0.999982 -6.27744e+66
    0.556422      0.50253     0.499986     0.499993     0.499993 -6.27744e+66
```

$$\delta u = (H^T H)^{-1} H^T \delta\rho$$

Problem solution (2/2)

- Read soln_HW1.pdf in the GitHub repository
- My solution is available here:
  - https://github.com/simpsonchristo/Soln-HW1-SimpsonAerospace