**Solution ASSIGNMENT 1, Dynamic System Estimation, 23.04.2019**

**Task 1: Sequential Adjustment**

Heights and standard deviations of drones per epoch

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| epoch | H1 | H2 | H3 | σH1 | σH2 | σH3 |
| 1 | 4.9725 | 9.9143 | 15.1723 | 0.0125 | 0.0177 | 0.0216 |
| 2 | 4.957 | 9.8852 | 15.2909 | 0.0501 | 0.0709 | 0.0868 |
| 3 | 4.9533 | 9.8753 | 15.4204 | 0.0573 | 0.0811 | 0.0993 |
| 4 | 4.9339 | 9.8364 | 15.5187 | 0.0649 | 0.0918 | 0.1124 |
| 5 | 4.9134 | 9.7962 | 15.6089 | 0.0699 | 0.0989 | 0.1211 |

**Task 2:**

Yes, it is possible to do a separate adjustment because we have more observations as unknowns. The variances would become smaller, since the drifts do no influence the residuals and hence, the variances.

**Task 3:**

* Enlarging the covariance, decrease weights of observations in previous epochs
* not using sequential adjustment but separate adjustment
* insert additional parameters for taking into account the drift (e.g. a constant drift rate for each drone)

**Task 4: Runge-Kutta Method:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Runge Kutta 4th order | |  |  |  |  |
| t | k1 | k2 | k3 | k4 | y' |
| 0 |  |  |  |  | 4 |
| 1 | 0.0000 | -0.2540 | -0.2626 | -0.5764 | 3.7318 |
| 2 | -0.5774 | -1.0754 | -1.2050 | -4.2388 | 2.1689 |
| 3 | -12.3203 | 2.0616 | -4.0116 | -1.9726 | -0.8632 |
| 4 | -0.6274 | -0.7583 | -0.8123 | -1.0160 | -1.6607 |
|  |  |  |  |  |  |
| Runge Kutta 3th order | |  |  |  |  |
| t | k1 | k2 | k3 |  | y' |
| 0 |  |  |  |  | 4 |
| 1 | 0.00000 | -0.25397 | -0.62389 |  | 3.72671 |
| 2 | -0.57831 | -1.07797 | -13.89766 |  | 0.59540 |
| 3 | 0.65330 | 0.85378 | 1.57645 |  | 1.53621 |
| 4 | 1.38813 | 2.14572 | -9.57470 |  | 1.60227 |

**Task 5:**