# ASEN 5044 HW 8 Main Script

## Table of Contents

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## Housekeeping

## Problem 1

Helper functions

```
F_a =

    1.0000    0.5000         0   -0.0056
         0    0.9997         0   -0.0225
         0    0.0056    1.0000    0.5000
         0    0.0225         0    0.9997


Q_a =

    0.8329    2.4983    0.0261    0.0953
    2.4983    9.9931    0.0719    0.3343
    0.0261    0.0719    0.2087    0.6266
    0.0953    0.3343    0.6266    2.5069


F_b =

    1.0000    0.5000         0    0.0056
         0    0.9997         0    0.0225
         0   -0.0056    1.0000    0.5000
         0   -0.0225         0    0.9997


Q_b =
```
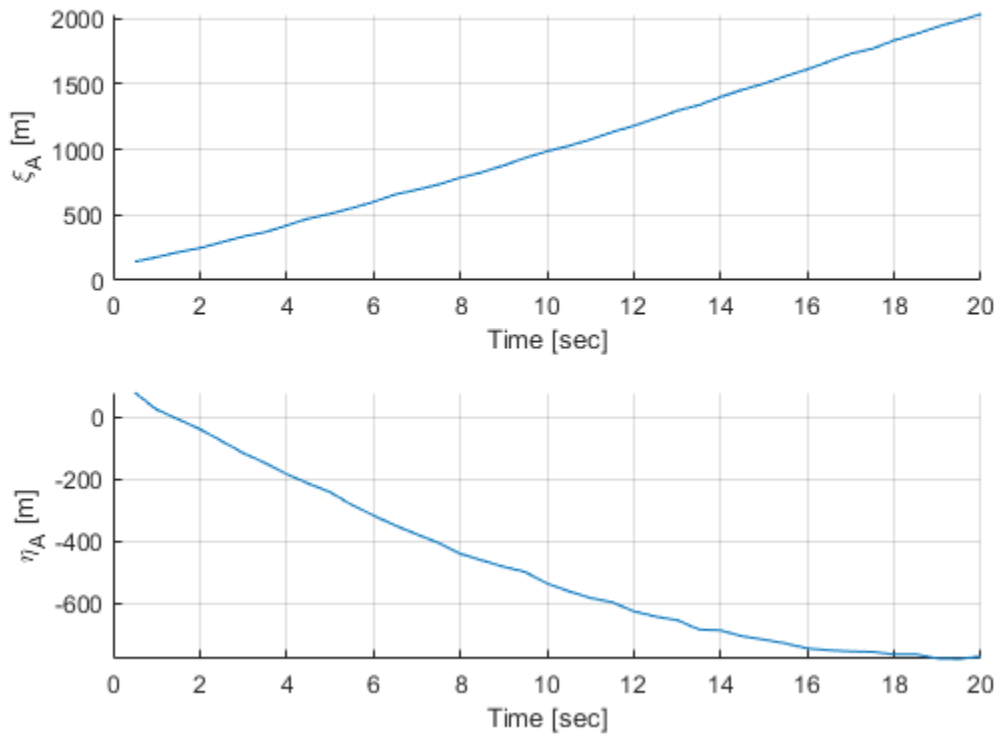
```
0.8336     2.5011     0.0156     0.0297
2.5011    10.0044     0.0531     0.1656
0.0156     0.0531     0.2080     0.6238
0.0297     0.1656     0.6238     2.4956
```
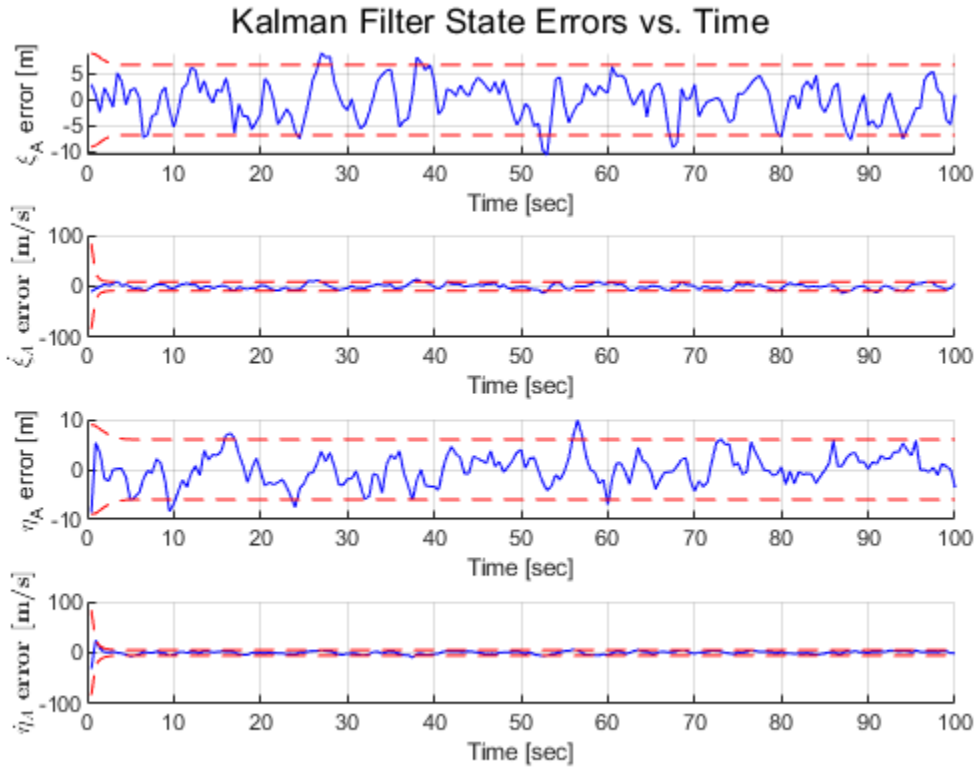
# Problem 2 setup

# Problem 2a



# Problem 2b

Setup

Kalman Filter State Errors vs. Time

# Problem 2 NEES/NIS tests

**NEES Statistic (N = 1, $\alpha$ = 0.05)**
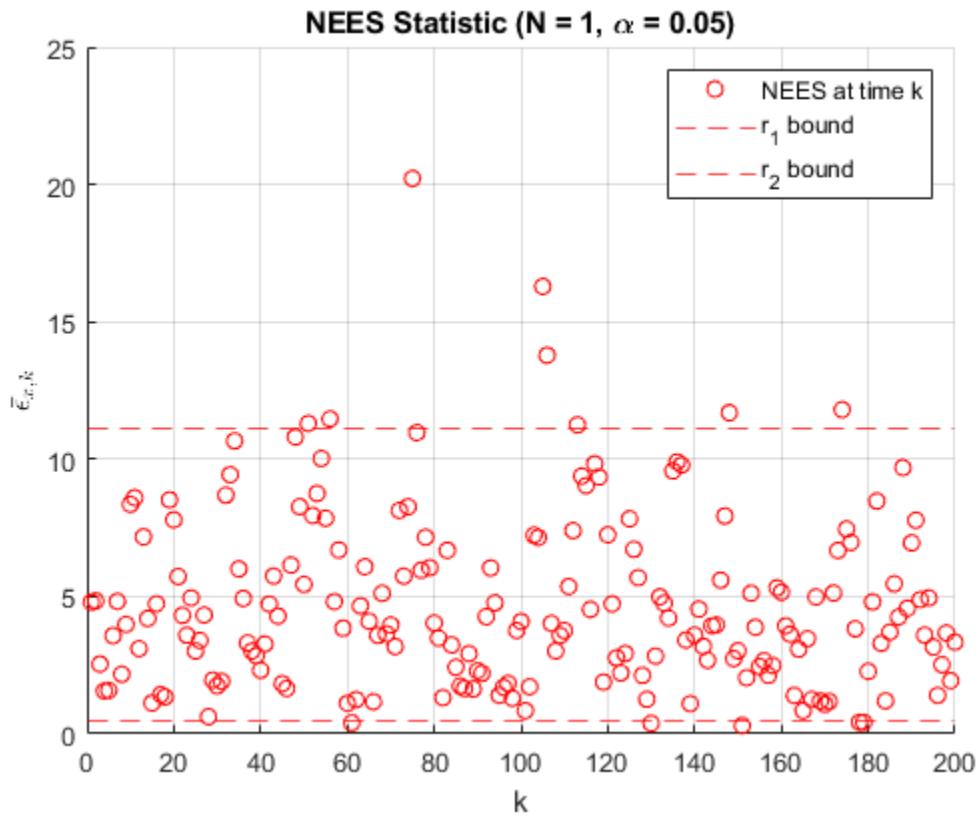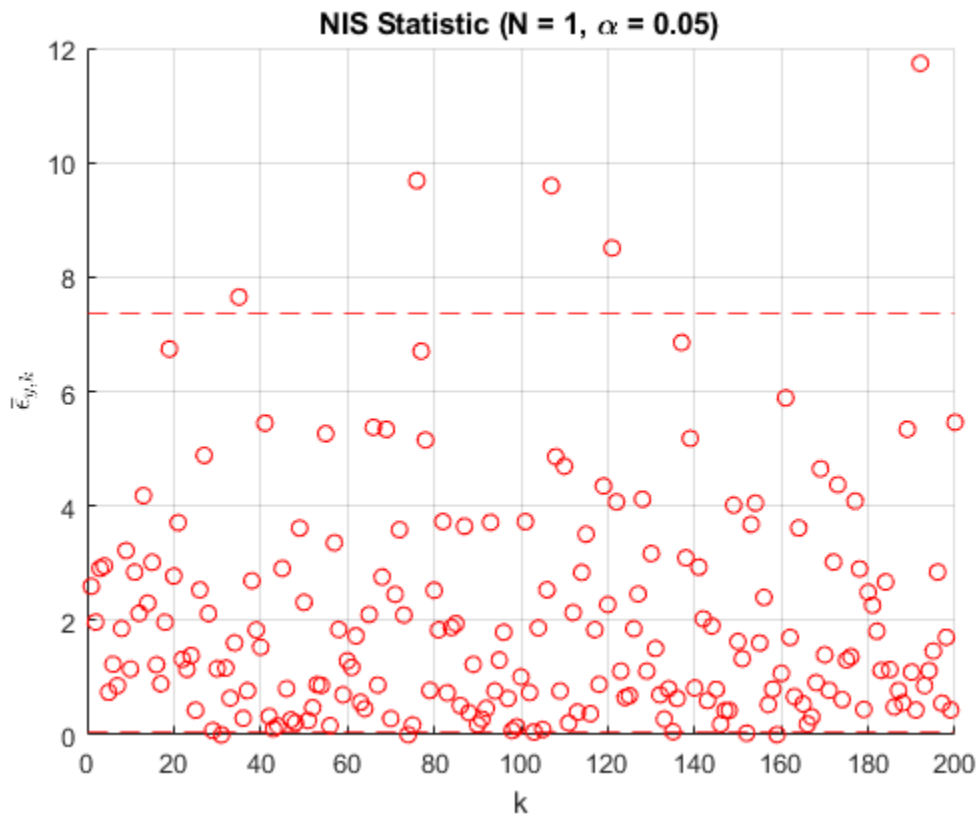
# Test function

# Problem 3a

Setup

## Position Errors for Aircraft A - Ground Station and Transponder

### $\xi_A$ error vs. time



### $\eta_A$ vs. time
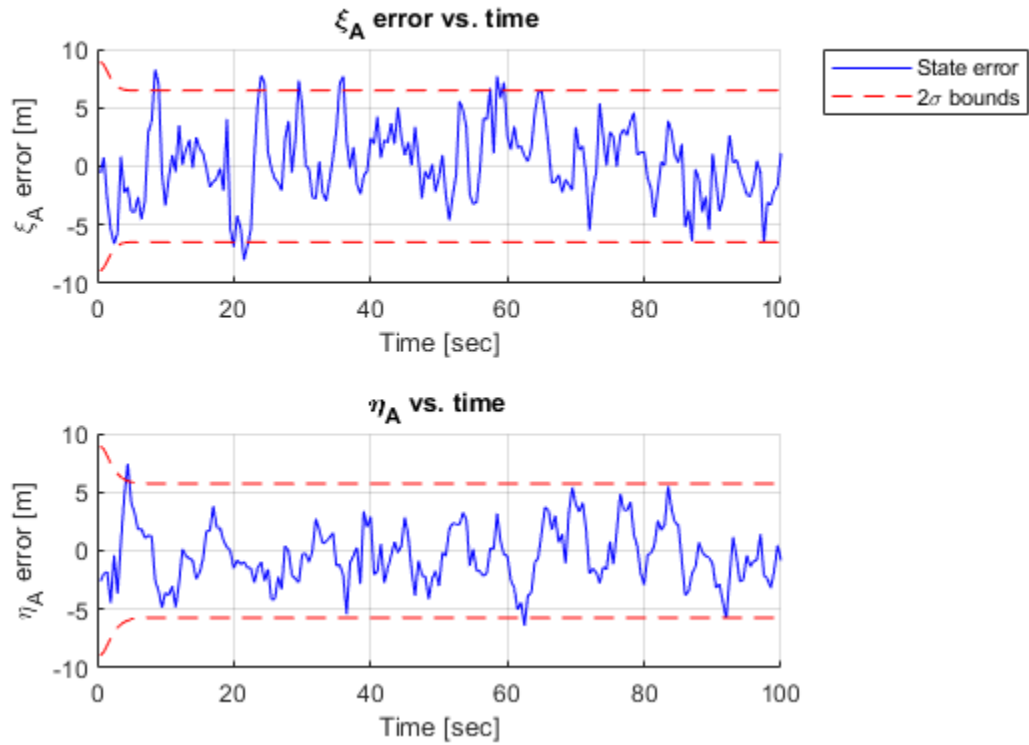


## Position Errors for Aircraft B - Ground Station and Transponder

### $\xi_B$ error vs. time



### $\eta_B$ vs. time
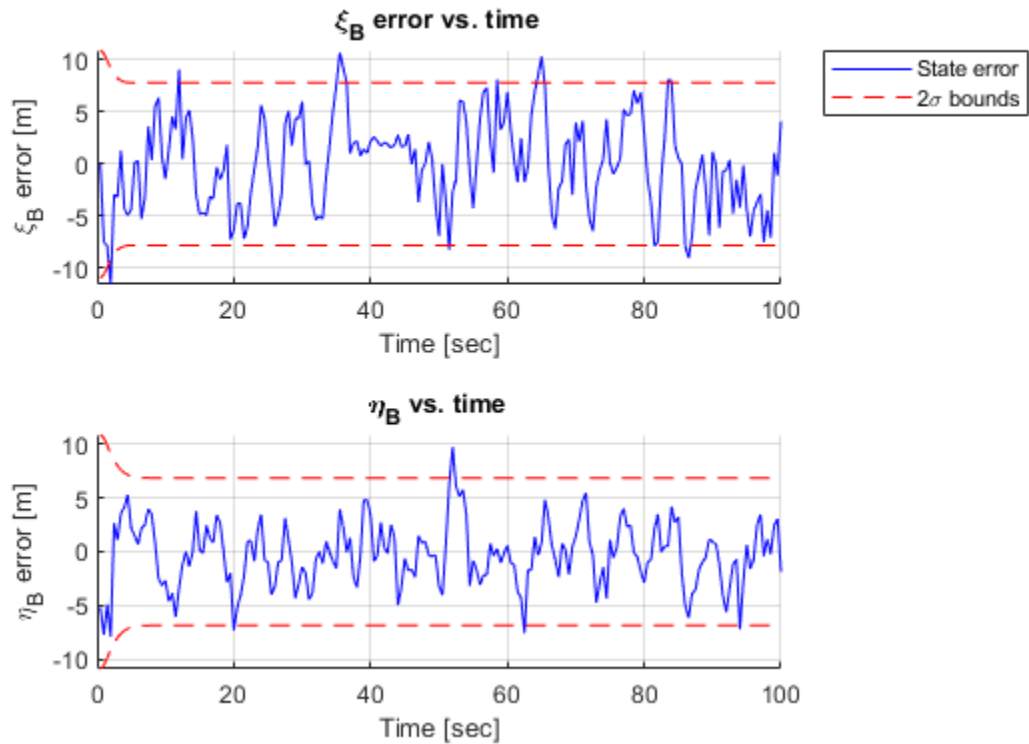
# Problem 3b

New matrices



Position Errors for Aircraft A - Transponder Only

## Position Errors for Aircraft B - Transponder Only

### $\xi_B$ error vs. time



### $\eta_B$ vs. time
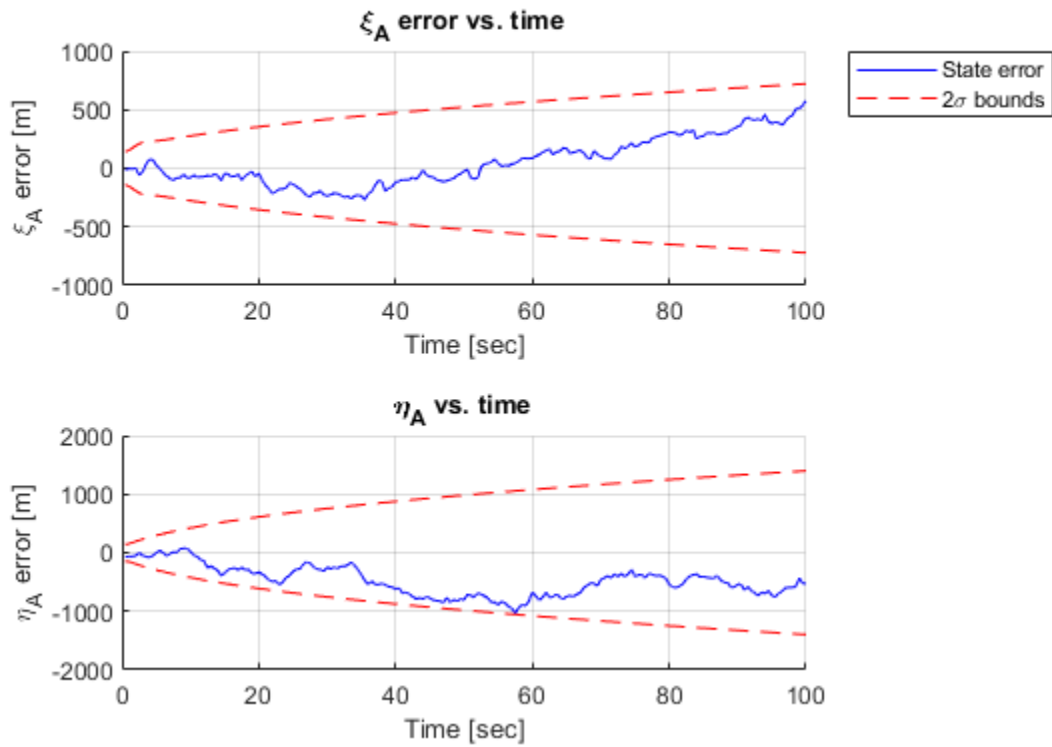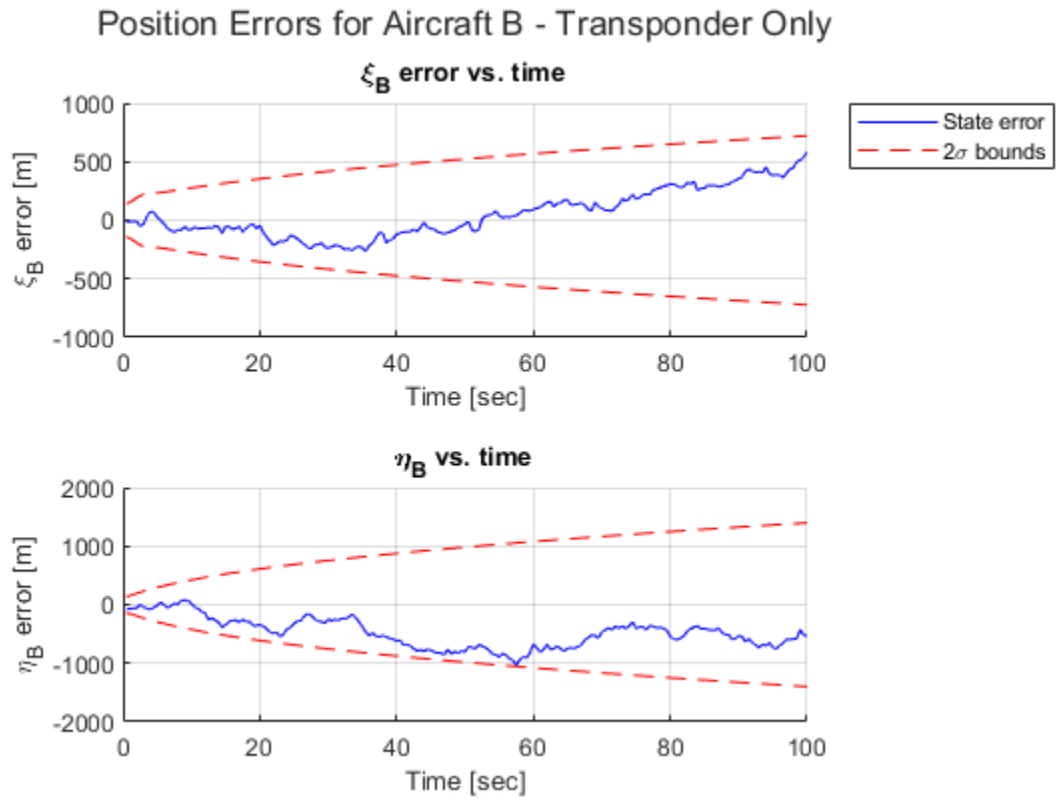


# Problem 3c

Measurement steps shouldn't matter, are ignored in this problem New matrices

## Position Errors for Aircraft A - Prediction only

### $\xi_A$ error vs. time

### $\eta_A$ vs. time

## Position Errors for Aircraft B - Prediction Only

### $\xi_B$ error vs. time

### $\eta_B$ vs. time
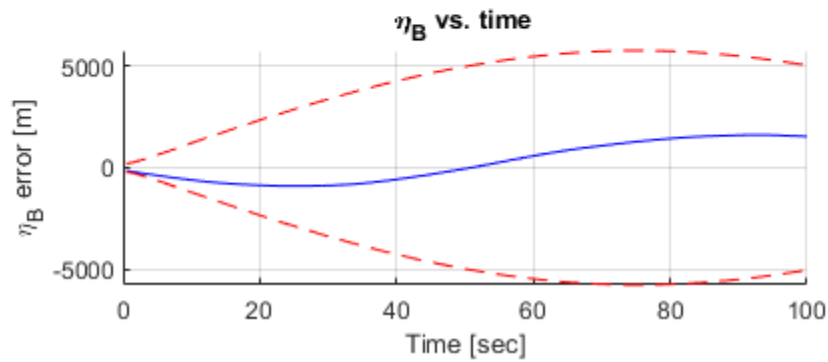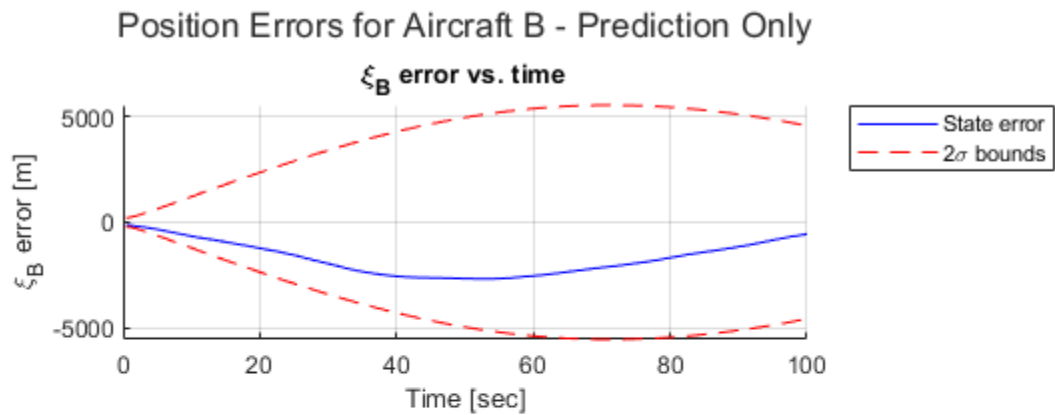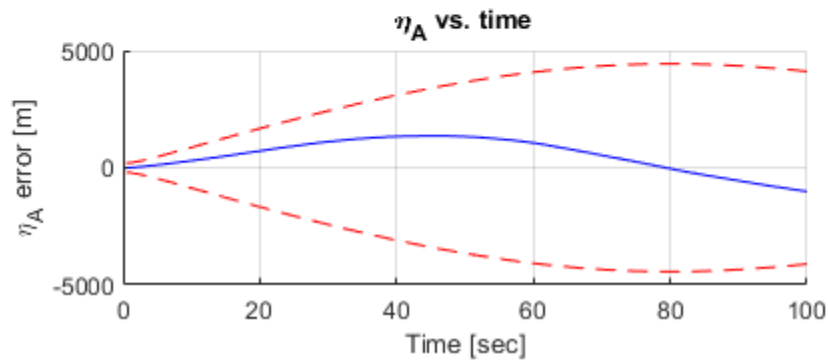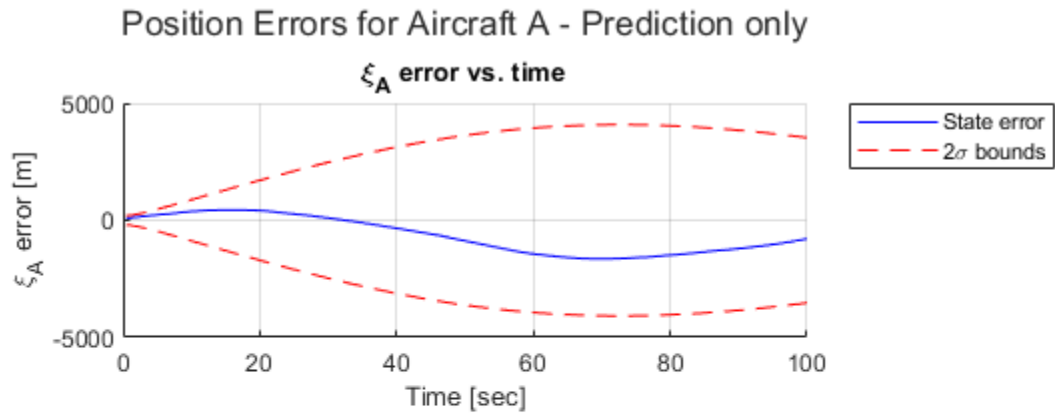
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