

MEM453 Project 3

Trim, Linearization, and LQR Controller Design

- 1. Unzip the attached 4_F18full_DUtrim_stab_R2015b.zip to the folder named 4_F18full_DUtrim_stab_R2015b and run the MATLAB/Simulink programs using MATLAB/Simulink R2015b following the instructions in the Chapter 7 Lecture notes: MEM453_Chap7_Notes_2024Summer.pdf**
- 2. In this given program, you will slightly modify it to obtain a desired trim (equilibrium) of straight level flight with angle of attack equal to 8 degree.**
- 3. Find the linearized model at the new trim (equilibrium), then conduct fundamental analysis for the linearized model to predict the aircraft flight performance based on the open-loop poles and damping ratio.**
- 4. Use the LQR optimal controller design approach to find a best controller for the linearized model at the trim, then conduct fundamental analysis for the closed-loop system of the linearized model with the optimal LQR controller.**
- 5. Predict the closed-loop aircraft flight performance based on the closed-loop poles and damping ratio, and comment on the differences between the closed-loop and open-loop performances.**