Thesis Progress Work

# Progress Report (05/07/2022)

### Days Till Handover = 123 (17 Weeks 4 Days)

**Aim:** Currently the thesis aim has changed. The goal now is to design a PID controller in terms of wing properties. The formula would be based around calculating the gains for the PID controller with the given formula

The values for would be determined from some relation to the wing properties.

**Design Process**

Simulation 1: The first sim is a 2D flat plate simulation. This will be used to generate a base value from which the gains could be iterated from. Along with this, simulation 1 should be able to provide insight into the relationship between the following properties

* Chord length
* Hinge point location (flap size)

Simulation 2: This will be a 2D numerical simulation using Nastran. This simulation should be able to show the relationship between the remaining 2D properties including

* Camber size
* Max Camber location
* Maximum thickness

This will be done through the use of the NACA formulas (4 and 5 digit)

Simulation 3: This will be a full 3D mesh simulation. This will be able to give relations to the following properties

* Sweep angle
* Wing span
* Taper ratio
* Flap span
* Tip chord
* Root chord

Other properties will be added if time permits

**Progress:** Over the weekend a meshing function was built in python for simulation 2. This takes an input file from the UIUC database or equivalent format and produces the grid and mesh card ready to be placed into NASTRAN input file. Simulation 1 still requires some research. Once simulation 2 is complete simulation 3 should just require an upgrade to the meshing software.

Nastran Simulation

**Case Control Deck**

**EIGRL** Defines data needed to perform real eigenvalue (vibration or buckling) analysis with the Lanczos

method.

**AERO** Gives basic aerodynamic parameters for unsteady aerodynamics.

**CAERO5** Defines an aerodynamic macro element for Piston theory.

**AEFACT** Defines real numbers for aeroelastic analysis.

**PAERO5** Defines properties of each strip element for Piston theory.

Chart

Description automatically generated