Relevant Reading

- Flight Vehicle Design Book

    - Chapter 5: Stability (18 pages)

- Engineering Design Optimization

    - Chapter 1: Introduction (32 pages)

Problem 1   Vocabulary

Explain the following terms; making sure to use sufficient detail, including any math or helpful figures. In some cases, these terms are simple one sentence definitions, in others, you should include several paragraphs to explain them fully.

Stability

- Static Stability

    - Aerodynamic Center
    - Center of Gravity
    - Static Margin
    - Stability Derivatives
    - Roll
    - Pitch
    - Yaw
    - Side Slip Angle

- Dynamic Stability

    - Stability Modes
    - Eigen Values

- Tails

    - Tail Volume Ratios

Optimization

- Design Variables

- Objective

- Constraints

Problem 2   Exploration

Complete the following exploration.

2.a   Prerequisites

i. Obtain, and become familiar with, the following tools auxiliary to VortexLattice.jl including:

    - The eigen value code

2.b   Stability

i. Explore how the Vertical and Horizontal Tail Volume Ratios affect the static and dynamic stability of an airframe.

ii. Explore how wing sweep and dihedral affect the static and dynamic stability of an airframe.

iii. In preparation for you next assignments, use what you found in the previous to steps to create an airframe (wing + tail) design that is stable.