Mini Wings Meeting

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General Approach

The general approach is as follows:

- Optimize to maximize L/D at a fixed angle of attack.
- Predetermine the total wing area based on wind tunnel model.
- Base the gap and stagger off the computed chord lengths.

Some assumptions:

- All the wings have the same planform.
- Decalage angle is constant (0°).

Optimization Setup

The design variables used are:

Design Variable	Lower Bound	Upper Bound
stagger	0.5	5.0
stagger row	0.0	5.0
gap	0.5	5.0
af col	1.0	5.0
af row	1.0	5.0
aspect	5.0	10.0

The problem has no other constraints and uses a genetic algorithm to determine the best(s) solutions.

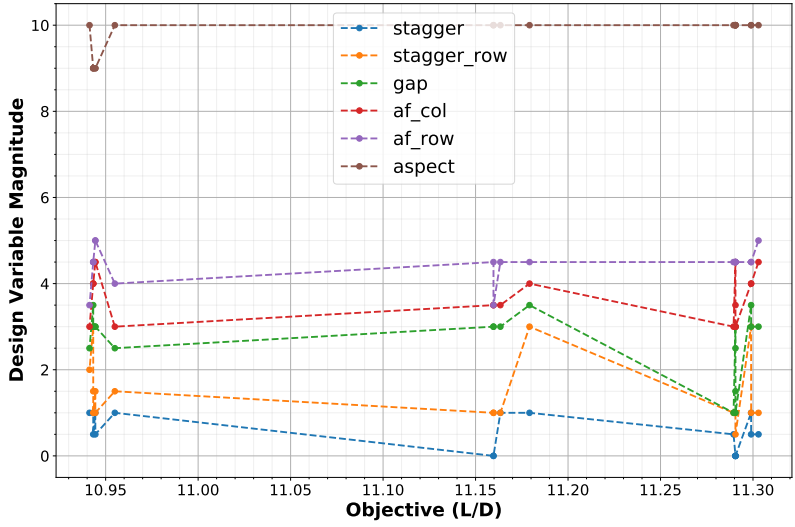
Analysis Approach

- Use AVL to determine lift and lift induced drag (C_{D_i})
- Use FRICTION (VT) Fortran code to calculate skin friction and pressure drag.

Limitations of analysis include:

- Not capturing viscous interactions.
- FRICTION code is limited to 1^{st} approximation. Essentially determined for a single wing and then multiplied by the number of wings.

GA Results


stagger
stagger_row
gap
af_col
af_row
aspect
Design Variable Magnitude
Objective (L/D)
0
2
4
6
8
10
10.95
11.00
11.05
11.10
11.15
11.20
11.25
11.30