# ANN for Estimating Aerodynamic Coefficients of a Non-Slender Delta Wing in Ground Effect

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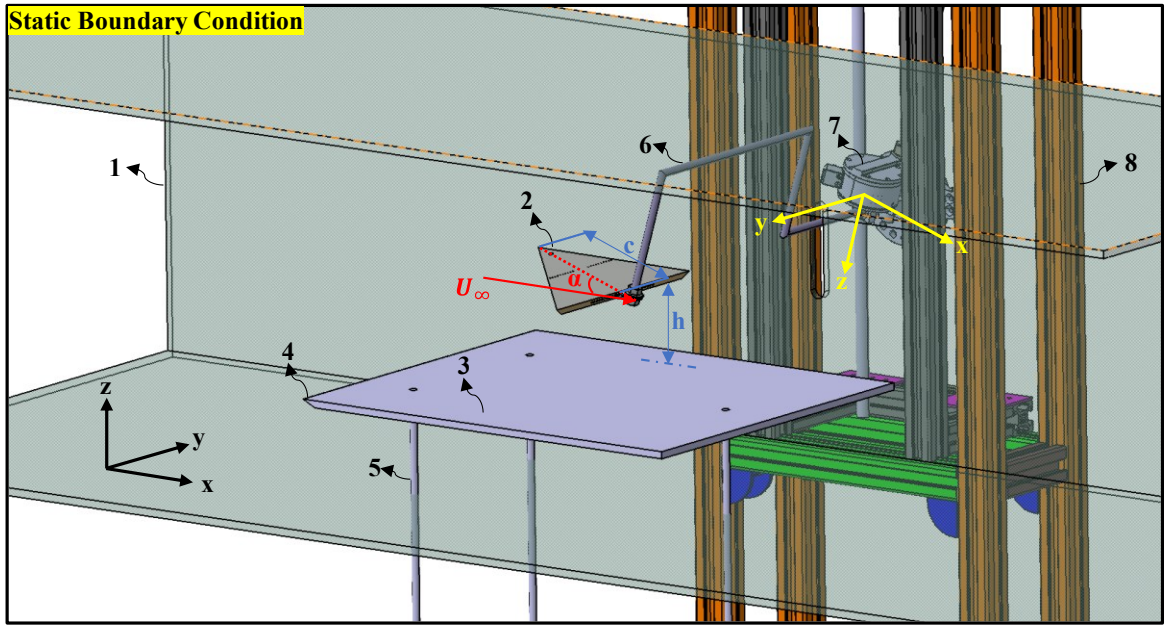
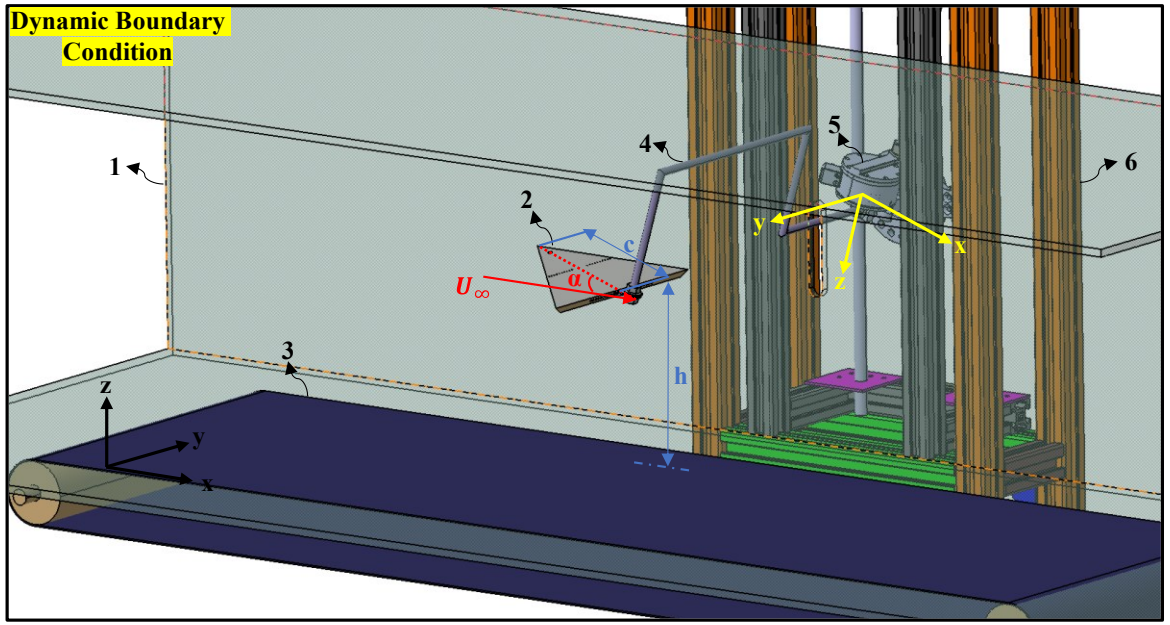
# Experimental set-up of aerodynamic coefficients



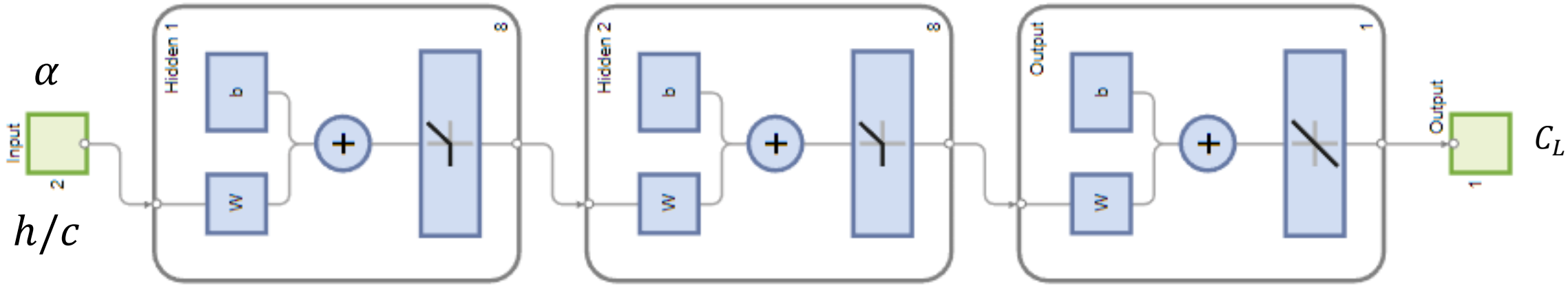

$$C_L = \frac{F_L}{0.5\rho U_\infty^2 S}$$

Table 1 Explanation of component numbers in Fig. 2

| Static boundary condition: | Dynamic boundary condition: |
|---|---|
| Wind tunnel side walls (1) | Wind tunnel side walls (1) |
| Delta wing model (2) | Delta wing model (2) |
| Static ground plate (3) | Moving belt (3) |
| Plate bevel (4) | Strut (4) |
| Ground plate rods (5) | F/T sensor (5) |
| Strut (6) | MPS (6) |
| F/T sensor (7) | |
| MPS (8) | |

(Yılmaz et al., 2025)

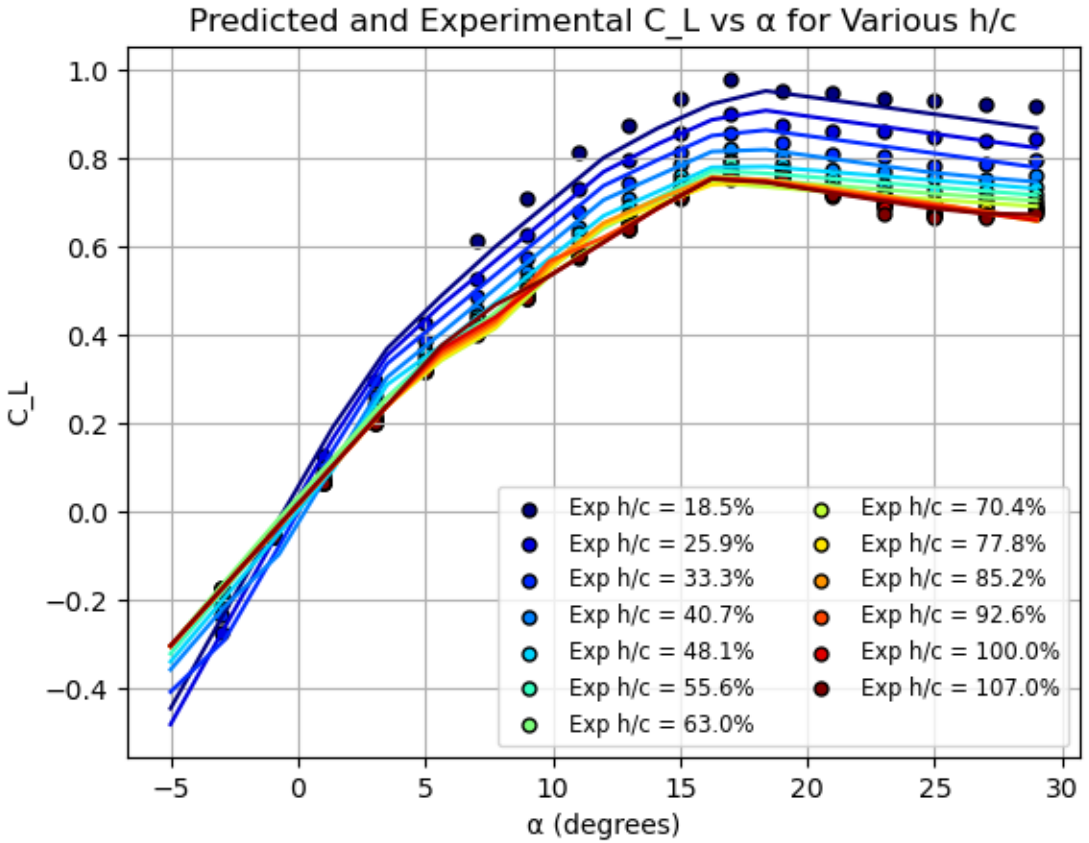
# Feed-forward Neural Network

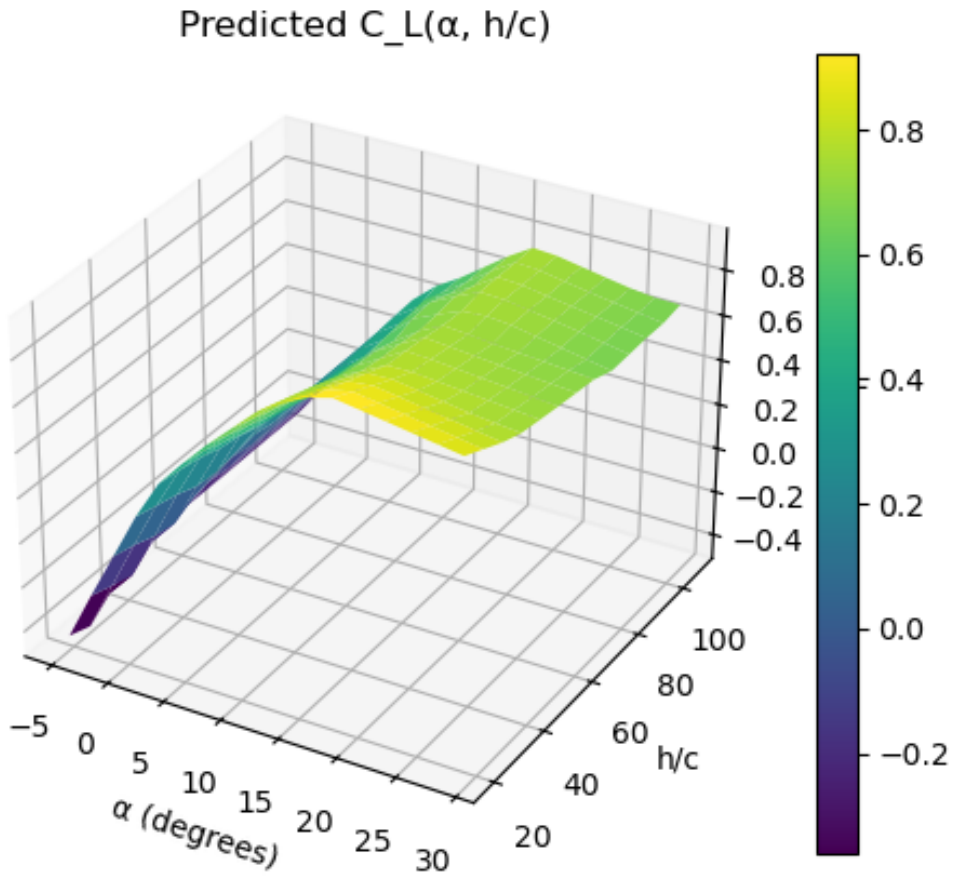



$$F = f\left(a + \sum_{j=1}^{h} v_j + \left[\sum_{i=1}^{k} g\left(w_{ij}x_i + b_j\right)\right]\right)$$

- $F$: Estimated value
- $a$: Bias value of the output
- $v_j$: Weight of the output value
- $w_{ij}$: Weight of the input layer
- $b_j$: Bias value of the input layer
- $x_i$: Input value

# Results


Predicted and Experimental C_L vs α for Various h/c
C_L
α (degrees)
Exp h/c = 18.5%
Exp h/c = 25.9%
Exp h/c = 33.3%
Exp h/c = 40.7%
Exp h/c = 48.1%
Exp h/c = 55.6%
Exp h/c = 63.0%
Exp h/c = 70.4%
Exp h/c = 77.8%
Exp h/c = 85.2%
Exp h/c = 92.6%
Exp h/c = 100.0%
Exp h/c = 107.0%


Predicted C_L(α, h/c)
α (degrees)
h/c