

## Karman Cloak (Force-Feedback Dominant)

$$\alpha_F = \dot{\alpha}_F - 14.95 \mu C_{l, \text{tot}}$$

Derivative term:  
captures action momentum

$\mu \cdot C_{l, \text{tot}}$ : adaptive viscosity scaling

$$\alpha_T = 3.414 \text{ (constant)}$$

Rear cylinders: passive constant rotation

## Illusion (Error-Tracking Dominant)

$$\alpha_F = C_{d, \text{tot}} - C_{d, \text{err}} - 5.43$$

$$+ 0.0098(\dot{u}_a + u_a)$$

Drag tracking:  
matches target cylinder drag

Phase correction:  
fine-tunes shedding timing

$$\alpha_T = (C_{d, \text{err}} - (C_{d, \text{rear}} - C_{l, \text{err}})) \times 0.535 + 2.78$$

Rear cylinders: error-state feedback