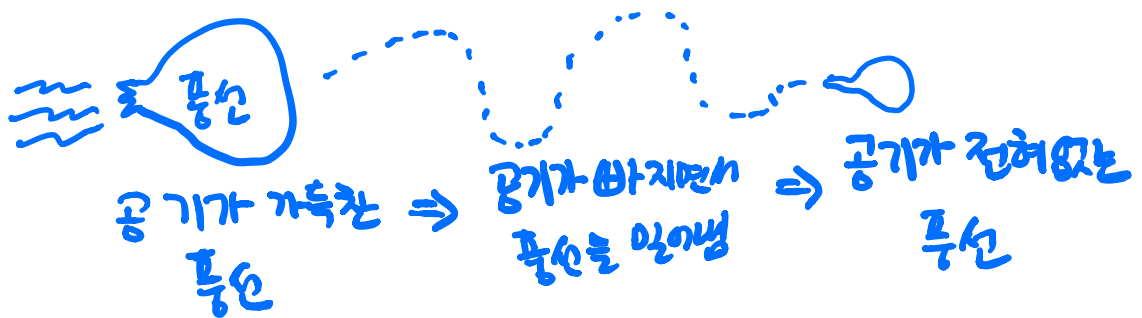


4가지 힘

- Lift (양력) 
- Thrust (추력) 
- Drag (항력) 
- Weight (중력) 

Thrust : 비행체를 움직이는 방향으로의 힘
(추력)



Drag : 움직임의 방향과 반대 방향으로 작용
저항력

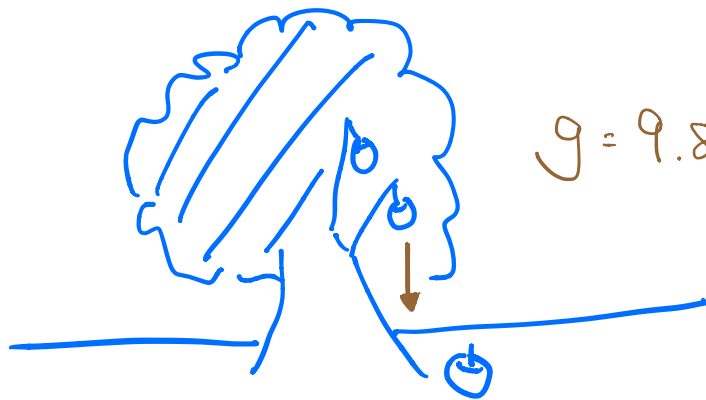


차가 움직이는 방향으로
손을 넓게 펴면
공기의 저항을 크게 느낌



손을 날음세우면
공기의 저항이 적어짐

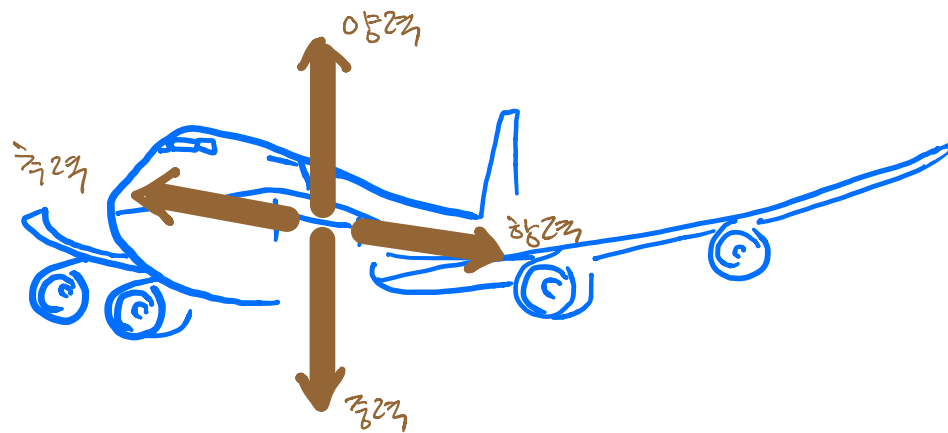
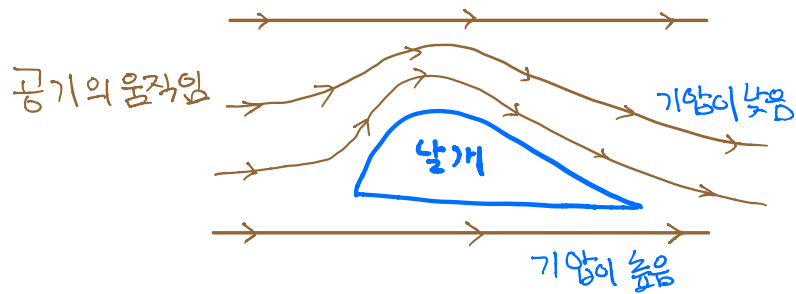
Weight : 중력이 잡아당기는 힘
중력/무게



$$g = 9.81 \text{ m/sec}^2$$

Lift : 비행기를 공중에 뜨게 하는 힘
 양력 비행기의 날개가 대부분의 양력을 만든다

날개 옆면의 공기의 움직임



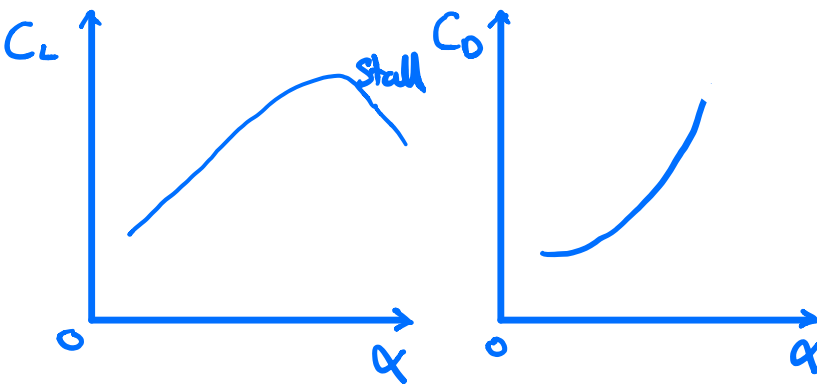
양력 $\downarrow$ 중력
 L W

추력 $\downarrow$ 항력
 T D

양력과 항력의 관계

· 날개 단위 면적당 양력의 크기
양력 식: $L = \frac{1}{2} \rho C_L V^2$

항력 식: $D = \frac{1}{2} \rho C_D V^2$

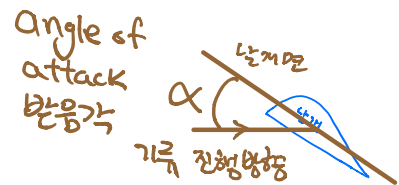


ρ : 공기밀도 (rho)
1.2754 kg/m³

V : 속도

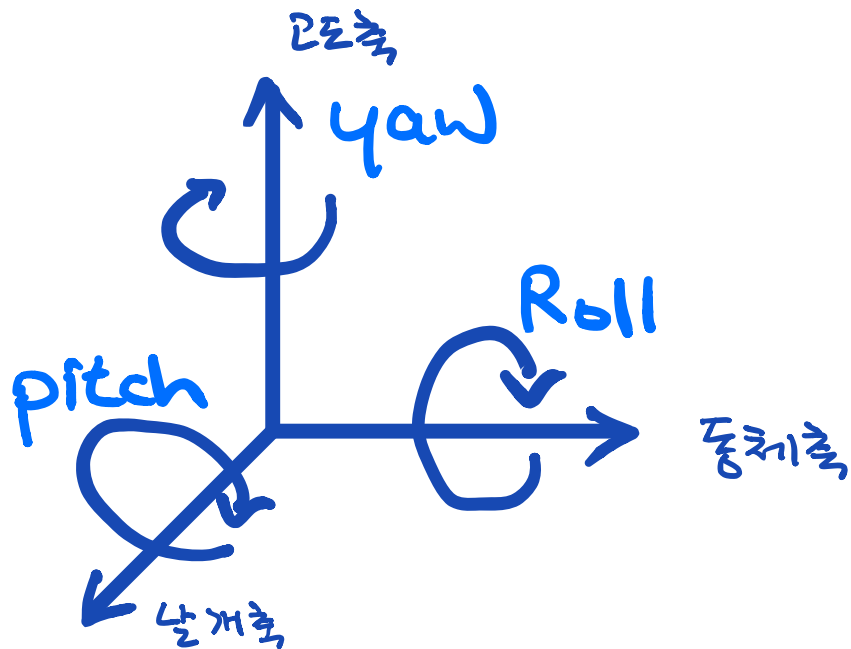
C_L : 양력 계수
날개 면적에 따라 결정됨

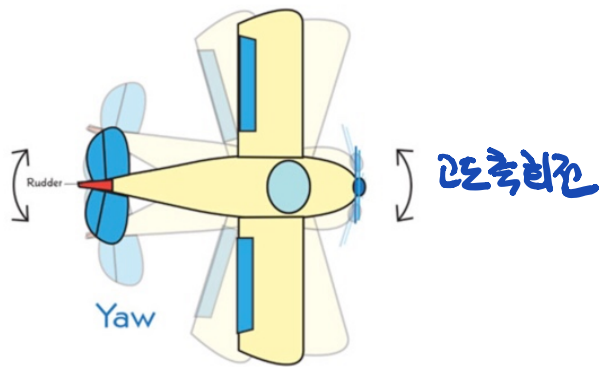
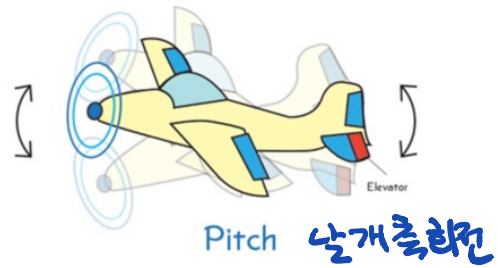
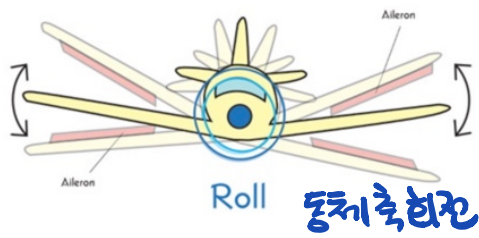
C_D : 항력 계수



3가지 회전모멘트

- Pitch 피칭 날개축회전
- Roll 롤링 동체축회전
- Yaw 요잉 고도축회전





Stability 안정성

- pitching stability (세로/날개축/피칭 안정성)
- Rolling stability (가로/동체축/롤링 안정성)
- Yawing stability (방향/고도축/요잉 안정성)

Pitching Stability (피칭 안정성)

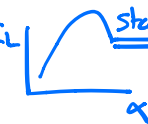
Center of Gravity Vs. aerodynamics Center
(무게 중심) (공력중심)

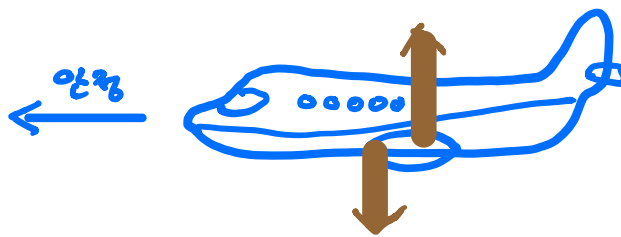
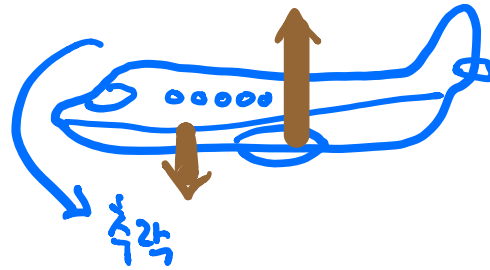
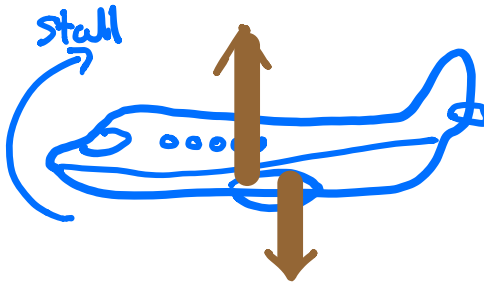
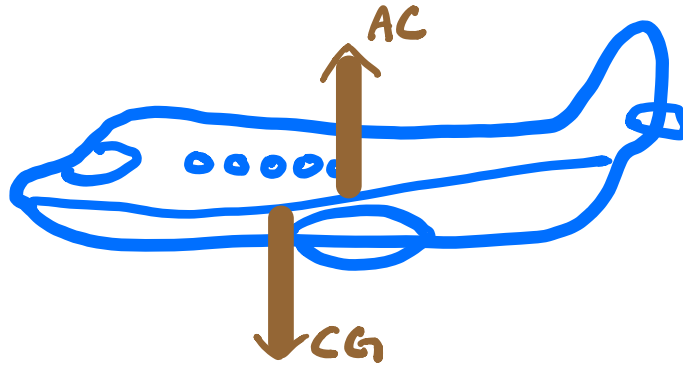
CG

무게 중심 앞 : 비행기의 반응이 느림

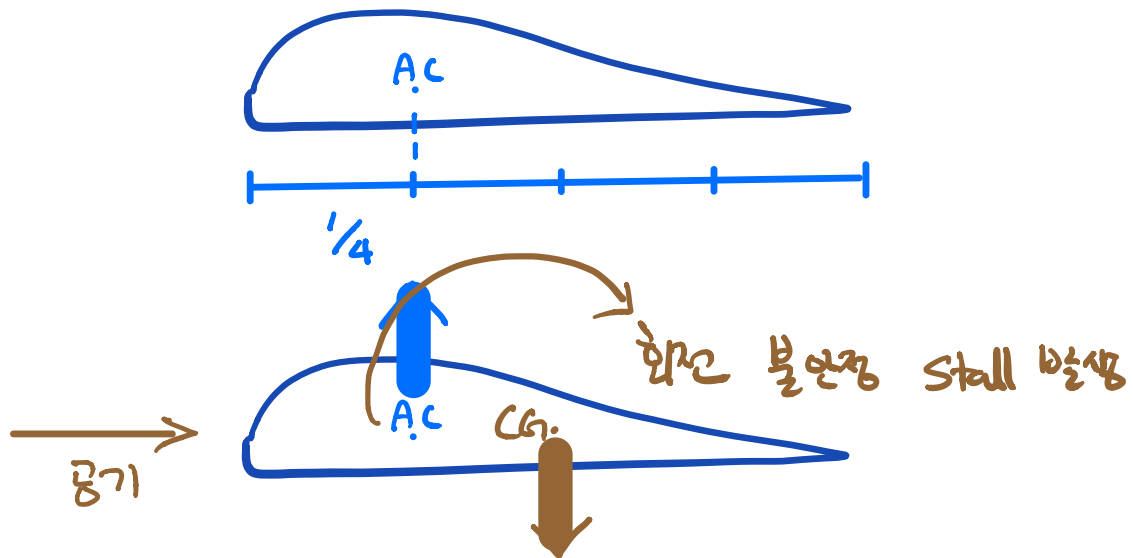
무게 중심 뒤 : 비행기의 반응이 빠름

AC

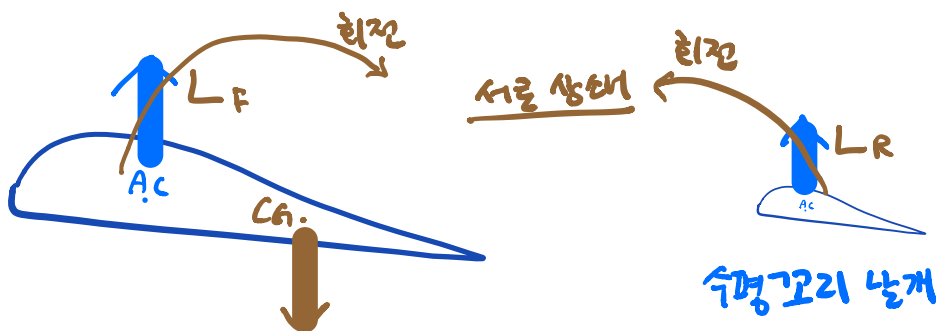
C_L  stall 주의



Aerodynamics Center (AC) 공기중심

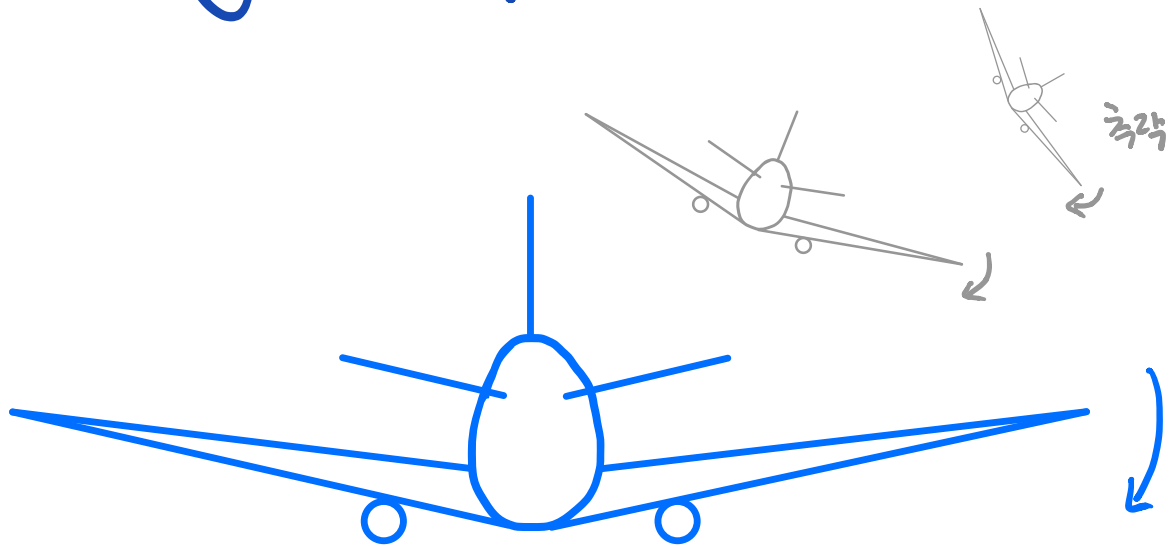


꼬리날개를 이용한 안정성 확보

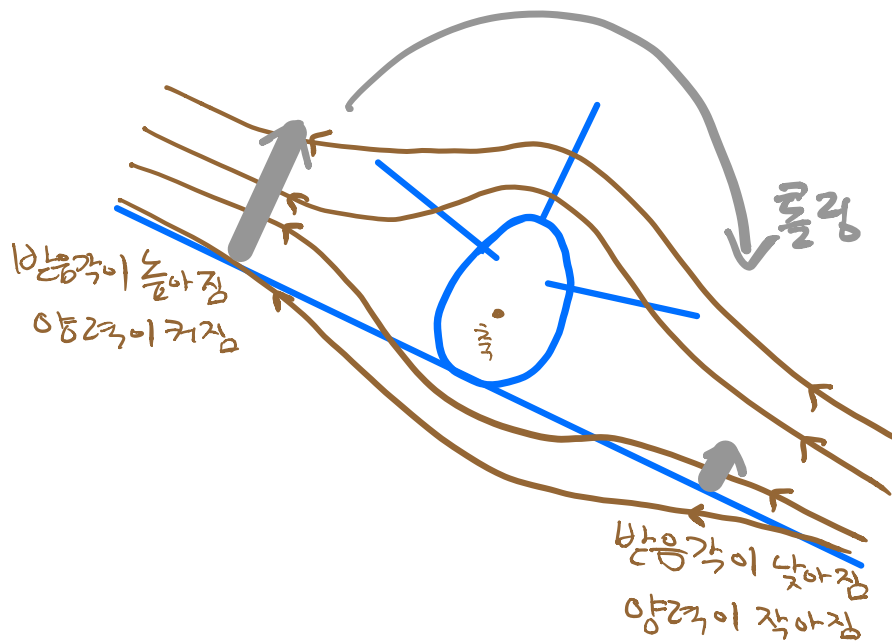


$$CG = L_F + L_R$$

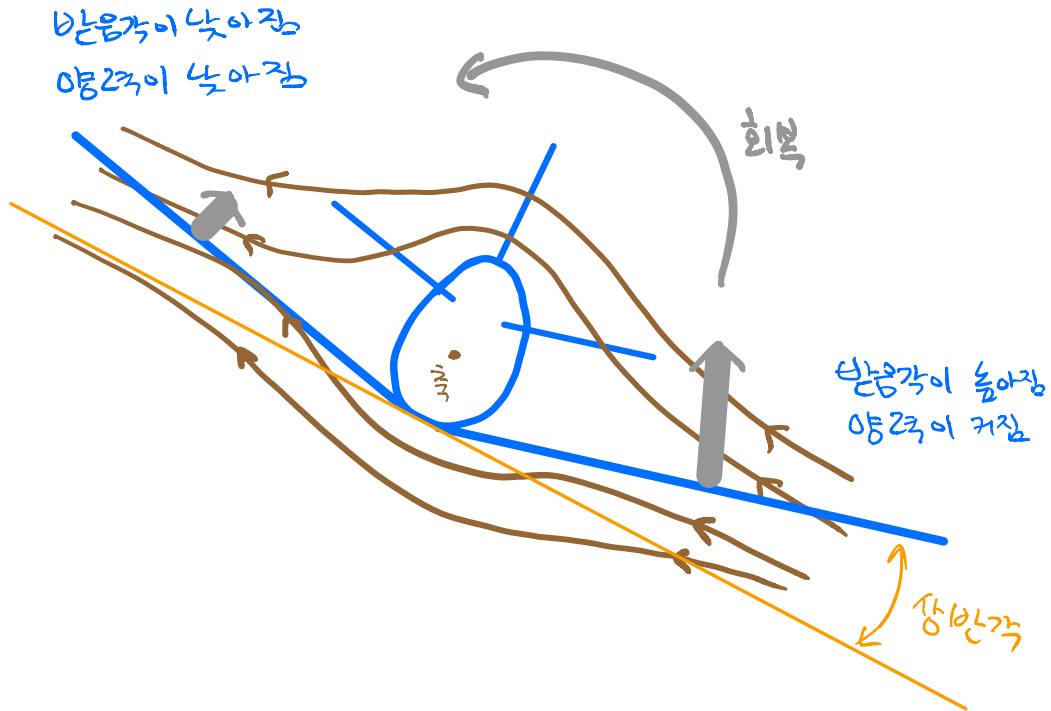
Rolling Stability (롤링 안정성)



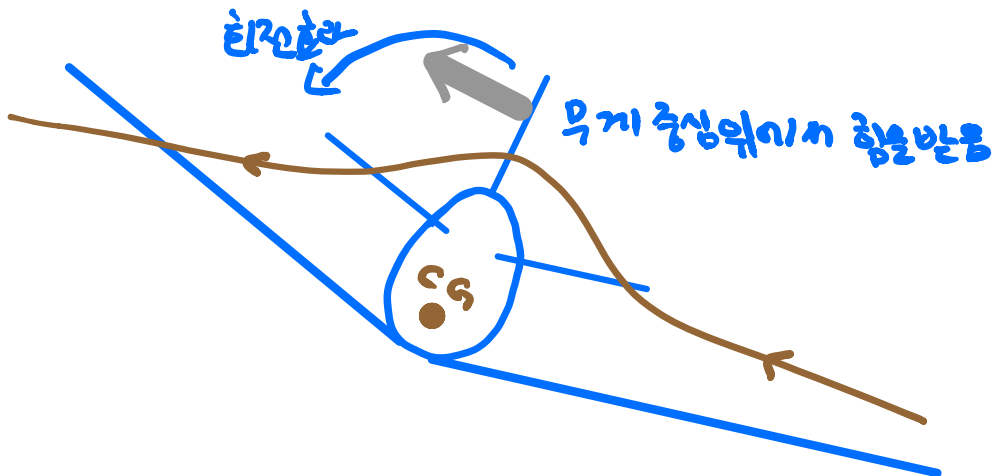
롤링 시 공기흐름



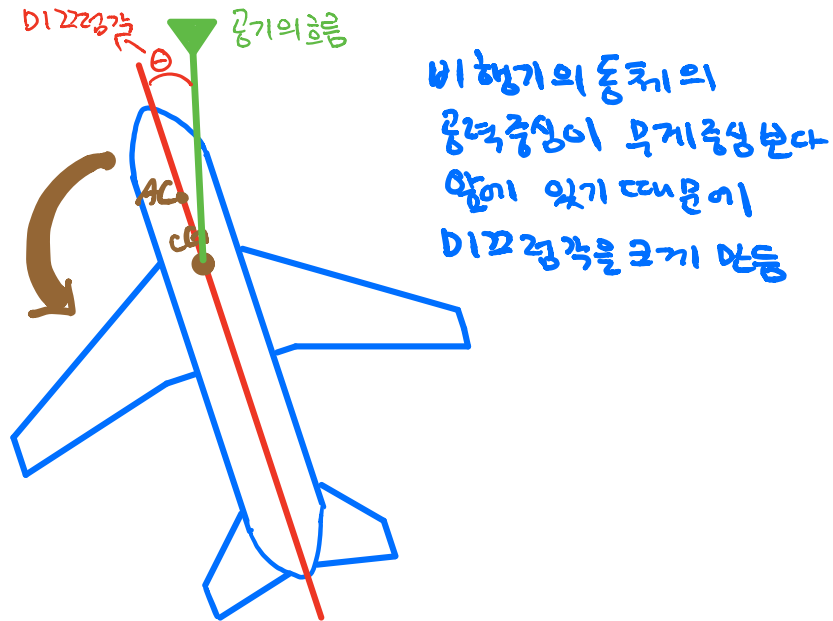
상반각을 이용한 롤링 안정성



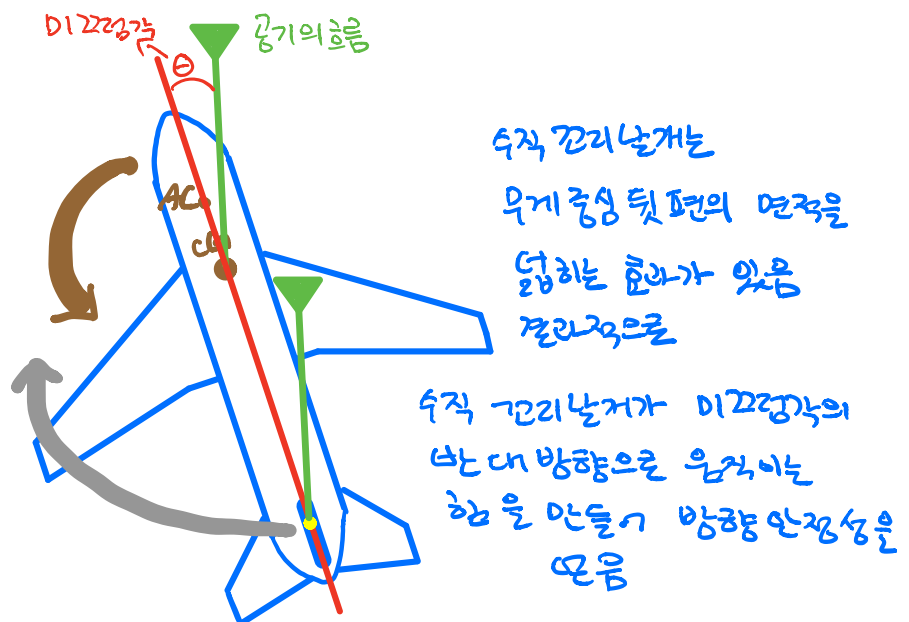
롤링 안정성에 미치는 수직 편심각의 영향



yawing Stability (요잉/방향 안정성)



수직 꼬리날개를 이용한 방향 안정성 확보



후퇴각을 이용한 방향 안정성 확보

