

# Principles of flight

Thursday, January 19, 2023 12:29 PM

## Objective:

- Student should develop knowledge of the elements related to the principles of flight
- Understand why airplanes are designed a certain way
- Forces acting on airplanes and the uses of those forces in flight

## References:

- Airplane Flying Handbook
- Pilot's Handbook of Aeronautical Knowledge

## Key Elements

- Stability vs Maneuverability
- Left turning tendency
- Load Factor

## Elements

- Airfoil Design
- Stability and controllability
- Turning tendency
- Load Factor in airplane design
- Wingtip Vortices

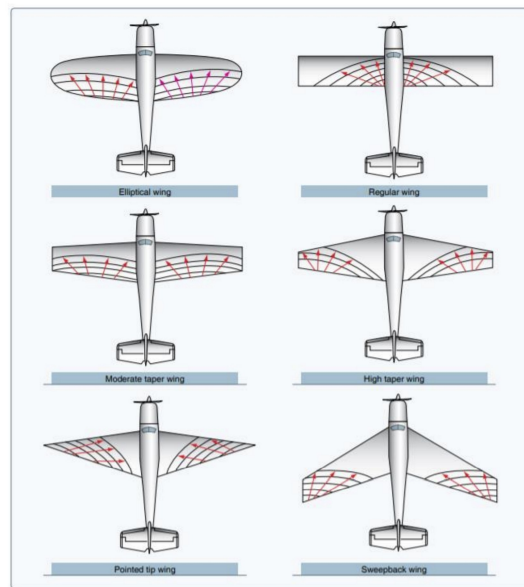
## Airfoil Design

Planform

Taper

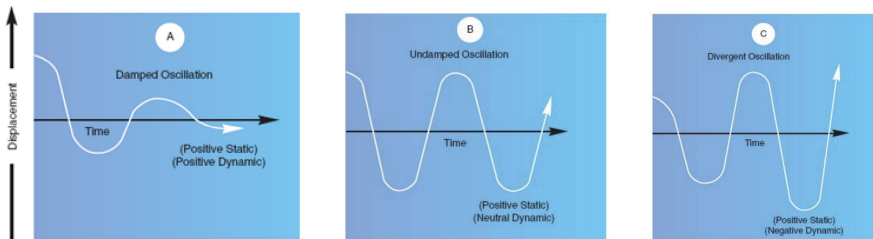
Aspect ratio

Sweep

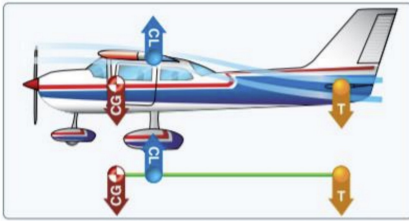


## Stability, Controllability, and Maneuverability

Static and dynamic

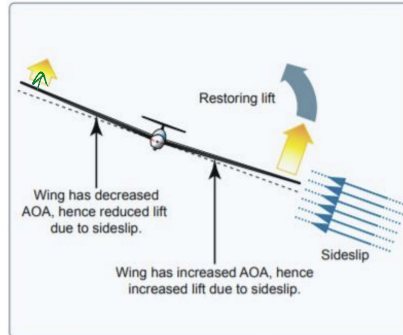


## Longitudinal stability

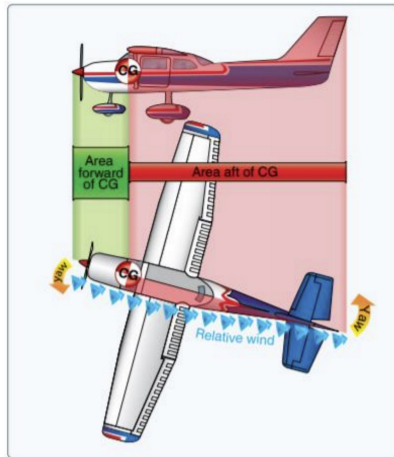


### Lateral Stability

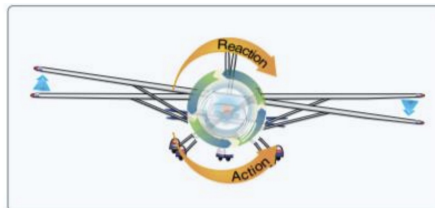
Affected by dihedral, sweepback angle, keel effect, weight distribution

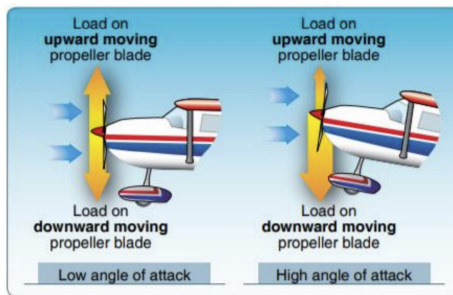
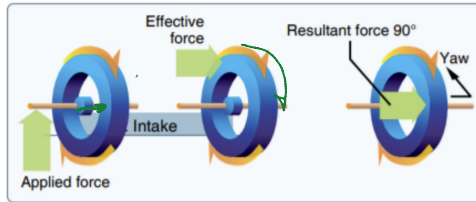
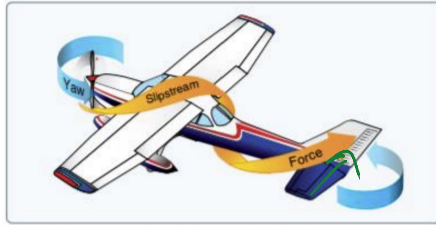


### Directional Stability

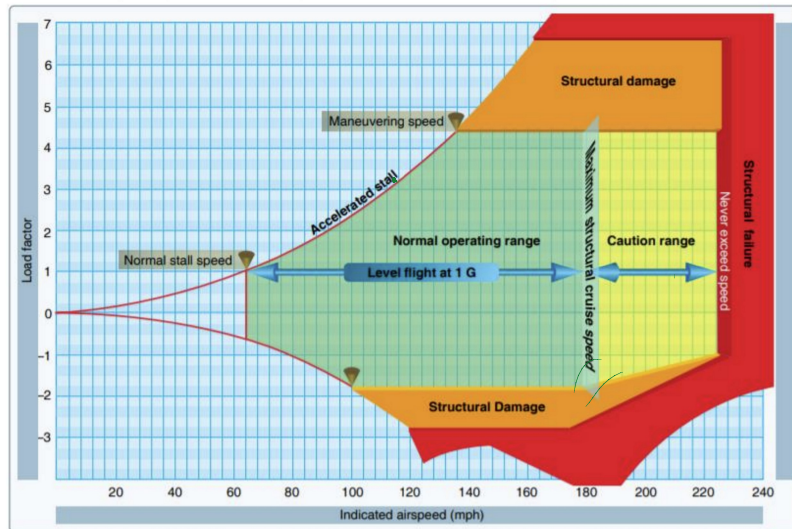
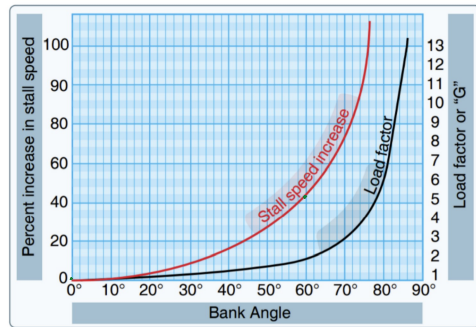


### Turning Tendencies

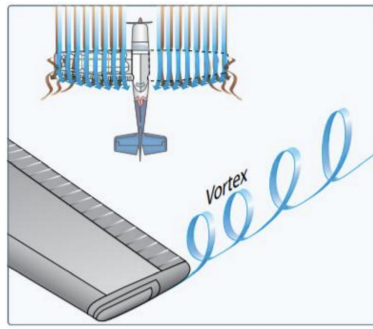




Load Factor



Wingtip Vortices



### Conclusion

- Stability vs Maneuverability
- Left turning tendency
- Load Factor

### Elements

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