



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF AEROSPACE ENGINEERING

23AST206 – AERODYNAMICS

II YEAR IV SEM

UNIT 3 – PARAMETERS FOR AIRFOIL AND WING CHARACTERISTICS

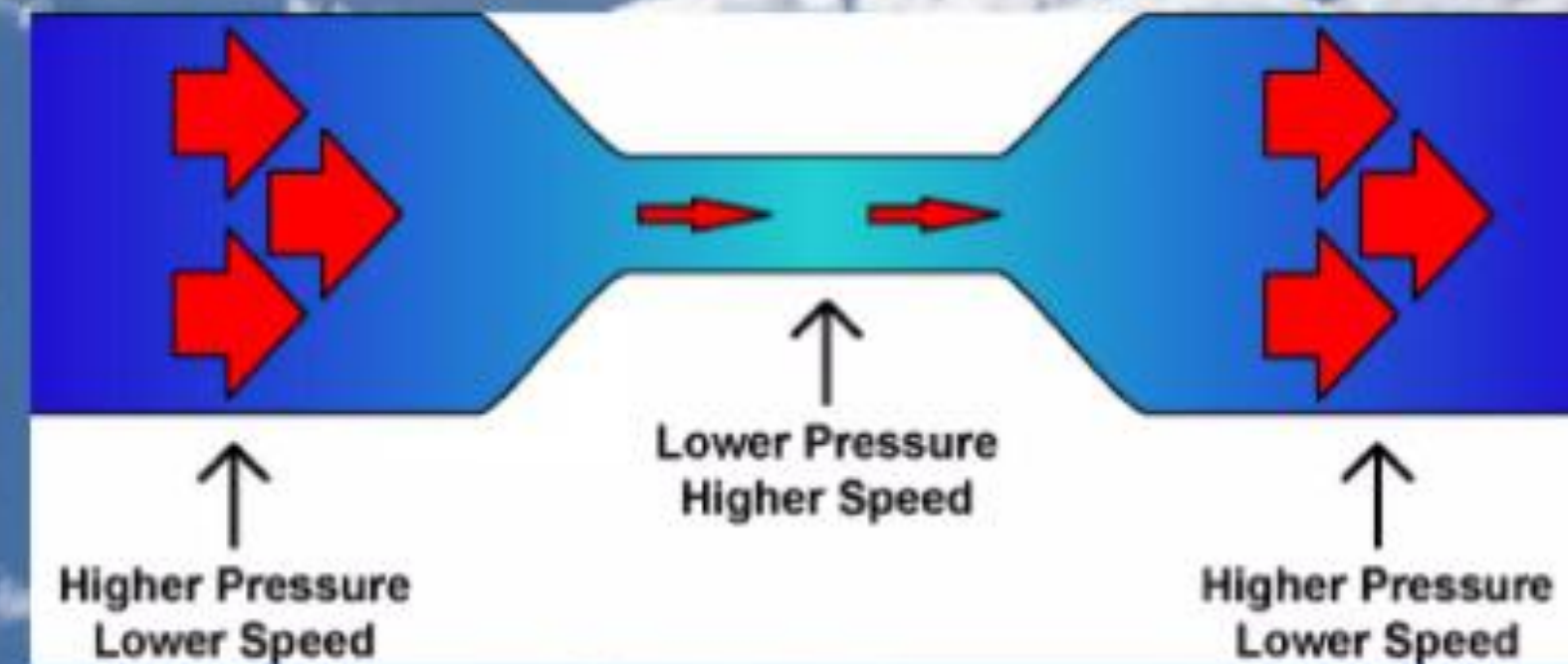
TOPIC – WING OF FINITE SPAN, LIFT, DRAG, LIFT/DRAG RATIO



WING OF FINITE SPAN, LIFT, DRAG, LIFT/DRAG RATIO

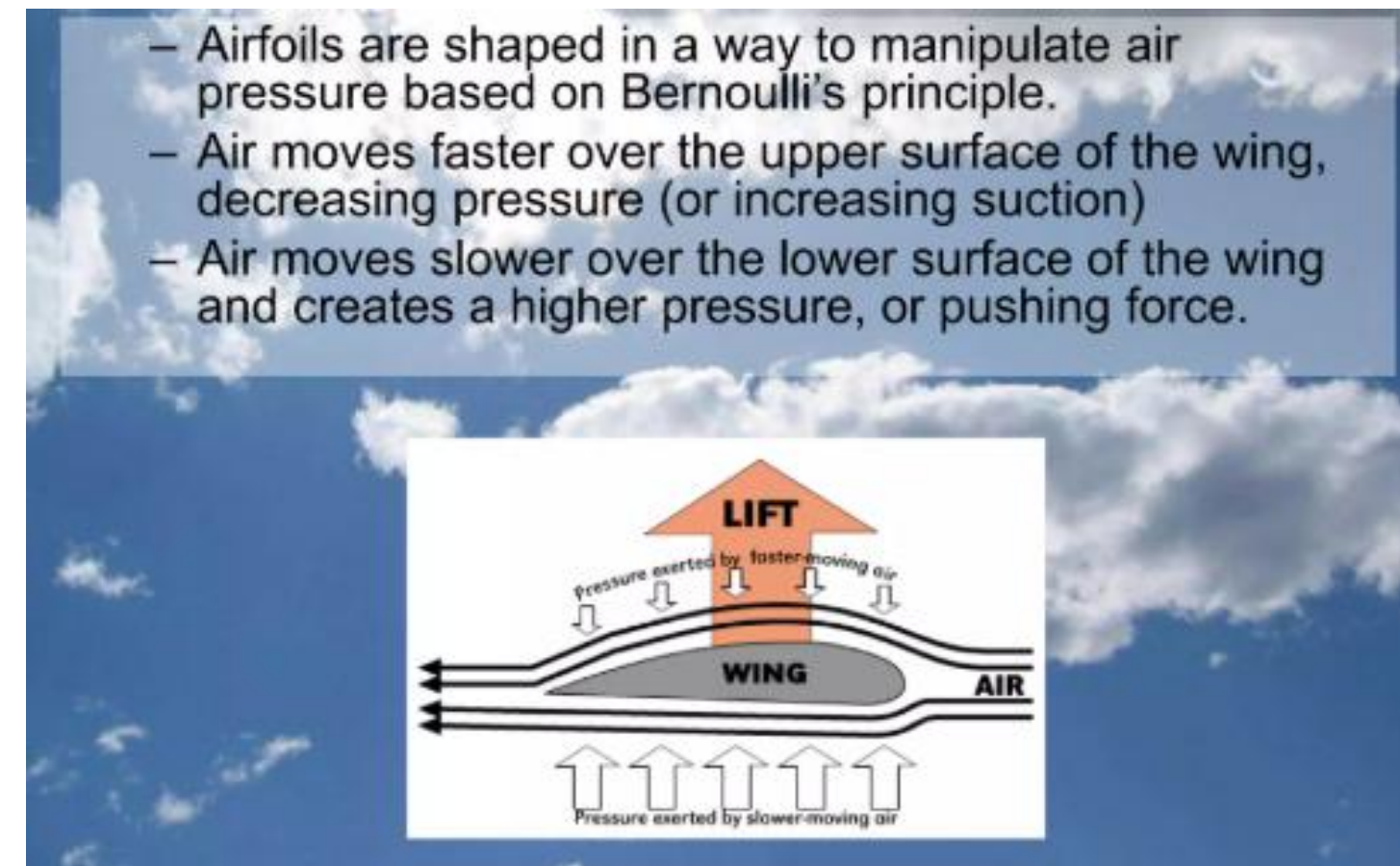
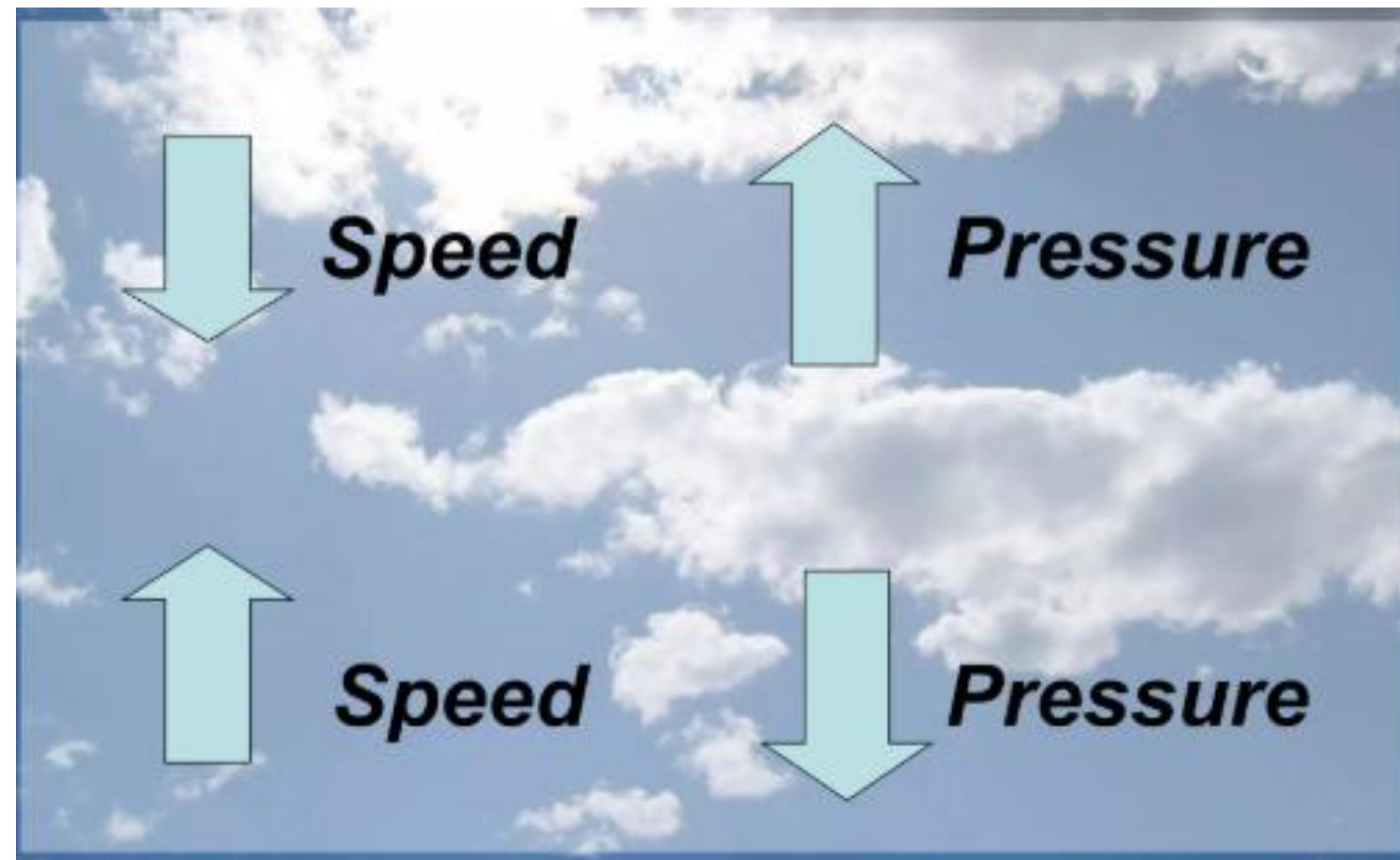


- Bernoulli's Principle
 - An increase in the speed of a fluid occurs simultaneously with a decrease in pressure or a decrease in the fluid's potential energy.





WING OF FINITE SPAN, LIFT, DRAG, LIFT/DRAG RATIO





WING OF FINITE SPAN, LIFT, DRAG, LIFT/DRAG RATIO



- Now we know how we get lift but how much can we get?
- One factor affecting lift is **Angle of Attack**
 - As the angle of attack increases, what happens to lift?

Lift Increases



- BUT... As the angle of attack increases, what happens to drag?

Drag Increases





WING OF FINITE SPAN, LIFT, DRAG, LIFT/DRAG RATIO



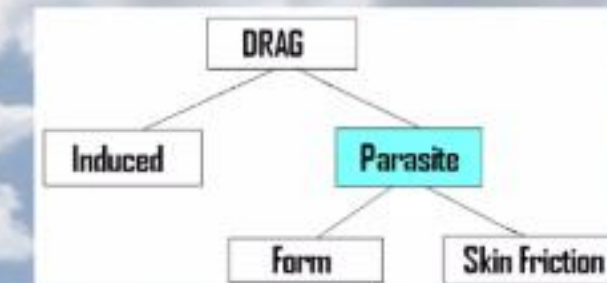
Parasite Drag

There are 2 main types of Drag:

1. Parasite Drag– This drag is further broken down
 - Form drag
 - Skin Friction
2. Induced Drag

Drag of all those parts the airplane which DO NOT contribute to lift

- This drag is hard to eliminate but it can be minimized
- Form drag is caused by the shape of the aircraft
 - Landing gear
 - Antennas
 - Struts
 - Wing tip fuel tanks





WING OF FINITE SPAN, LIFT, DRAG, LIFT/DRAG RATIO

Lift Equation

As shown in the middle of the slide, the L/D ratio is also equal to the ratio of the lift and drag coefficients. The lift equation indicates that the lift L is equal to one half the air density ρ times the square of the velocity V times the wing area A times the lift coefficient C_l :

$$L = C_l \cdot \frac{\rho \cdot V^2 \cdot A}{2}$$

Drag Equation

Similarly, the drag equation relates the aircraft drag D to a drag coefficient C_d :

$$D = C_d \cdot \frac{\rho \cdot V^2 \cdot A}{2}$$

Dividing these two equations give:

$$\frac{L}{D} = \frac{C_l}{C_d}$$

Act



Thank You