

- Flight mechanics and angles - (Green level)

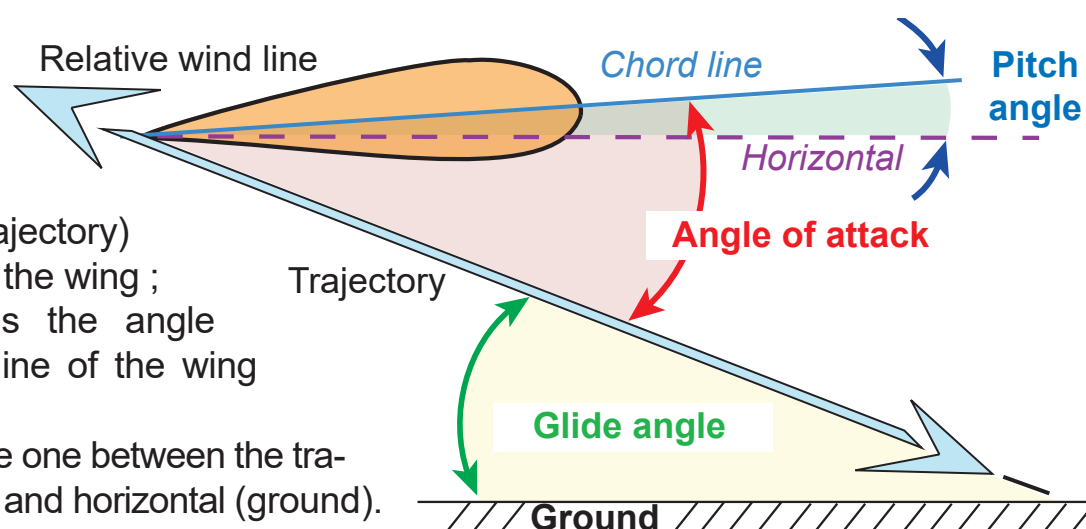
Angles

The **angle of attack** is the angle between the relative wind (trajectory) and the chord line of the wing ;

The **pitch angle** is the angle between the chord line of the wing and horizontal ;

The **glide angle** is the one between the trajectory (relative wind) and horizontal (ground).

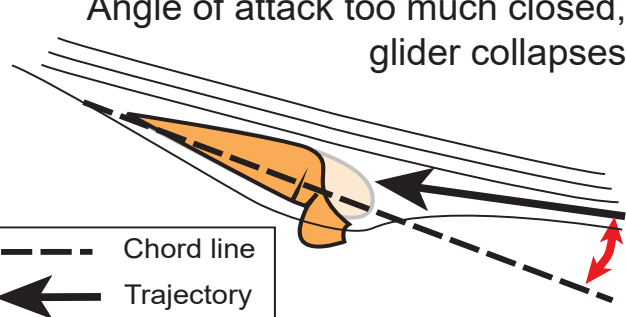
Caution : we can't visualise the angle of attack while a glider is flying, counter to the pitch angle that we can assess when having an idea of horizontal.



Angle of attack too much open, glider stalls



Angle of attack too much closed, glider collapses



Limits of the angle of attack

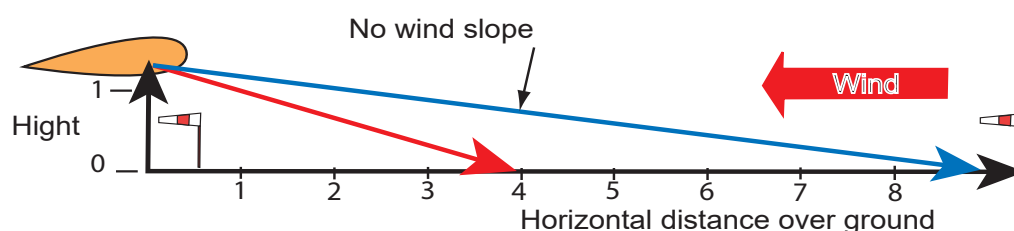
$$\text{L/D glide ratio} = \frac{\text{Horizontal distance}}{\text{Height}}$$

Glide ratios

Ground glide ratio \Rightarrow L/D glide ratio modified by wind effect

L/D glide ratio is the ratio of the change in altitude to the change in horizontal distance. On today's gliders the best glide ratio is obtained flying «arms up».

Best glide ratio \Rightarrow better glide performance

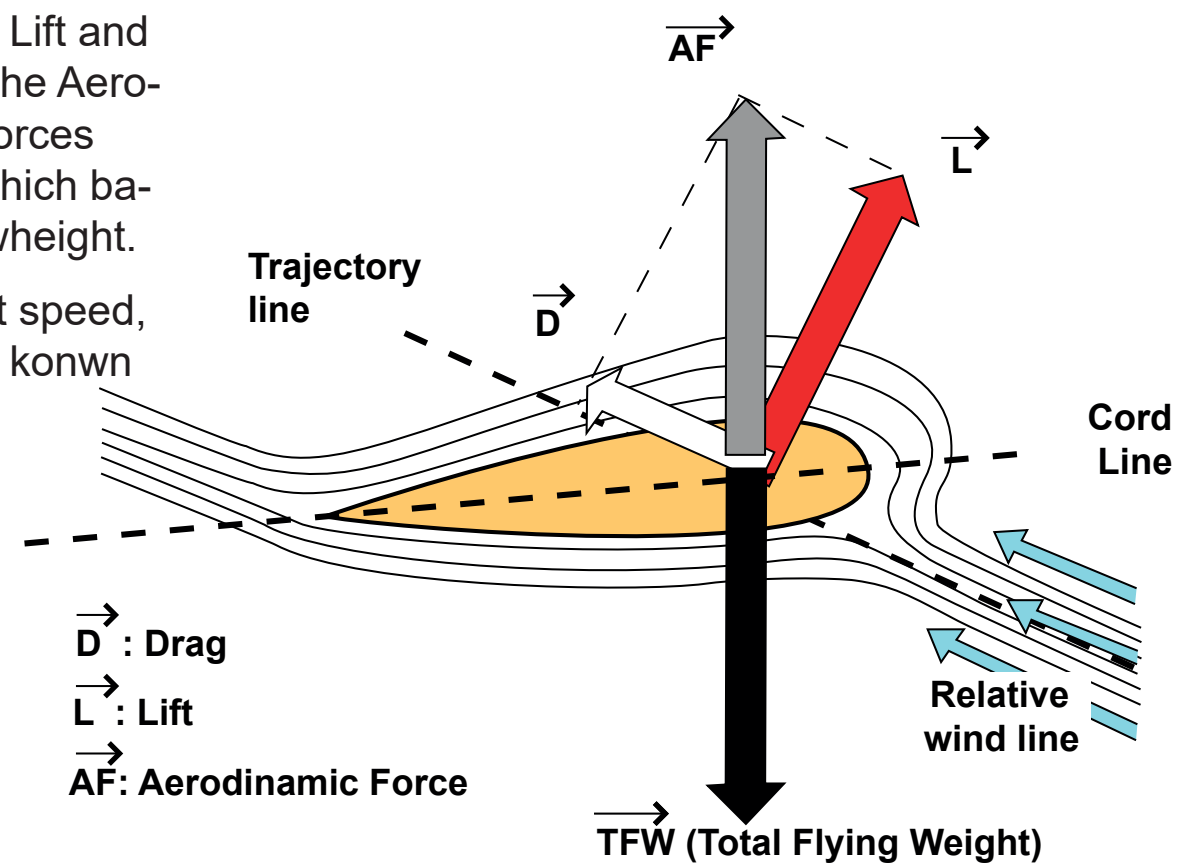


Head wind decreases distance flown over ground. You get the best ground glide ratio increasing speed on trajectory (pushing speed bar).

Aerodynamics and mechanicals principles

Adding the Lift and Drag give the Aerodynamic Forces resultant which balance the weight.

At constant speed, the flight is known as «balanced».



Why does it fly ?

The movement of the glider flying organises an air flow around the profile : this creates the relative wind.

This air flow generates the aerodynamic force opposed to the weight.

The lift is the sum of some high pressure on the lower part of the wing and some low pressure on its upper part. The lift acts perpendicular to trajectory.

The drag opposes to the glider motion through the air. It adds itself to the lift to create the **Aerodynamic Force** in order to balance the **Total Flying Weight**

Relative Wind : Created by moving an object.
– «Relative», because relative to the moving object.
– Relative Wind, wind force equal to displacement speed, in opposite direction to trajectory.