

Technical Course for Coaches Level 3 – Speed & Trim



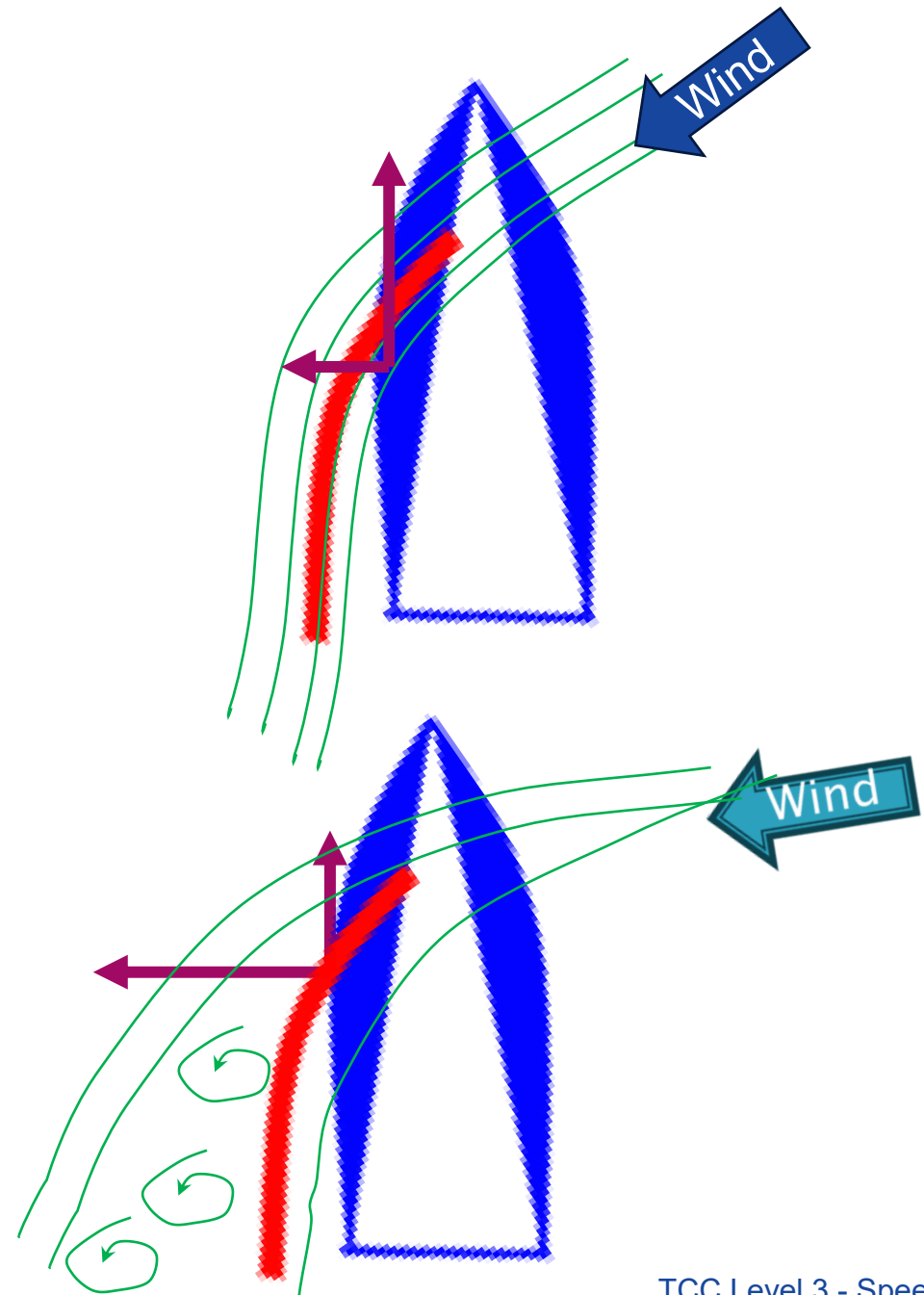
The main sail in proper position

In this case there is small side force and big forward force so, the boat is healing less with maximum speed

The main sail is pulled more

In this case due to the turbulences there is big side force and small forward force so ..

The boat is healing a lot without speed

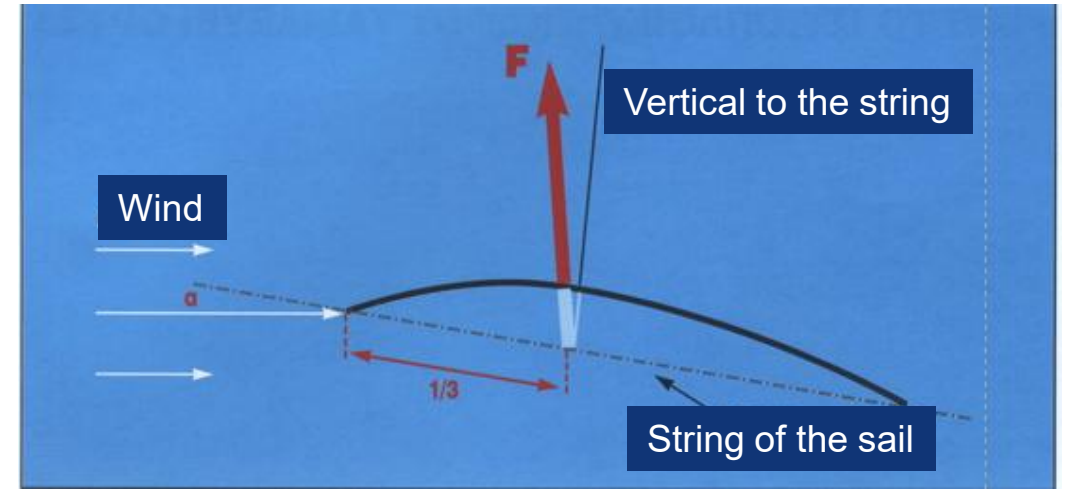


Bearing Away

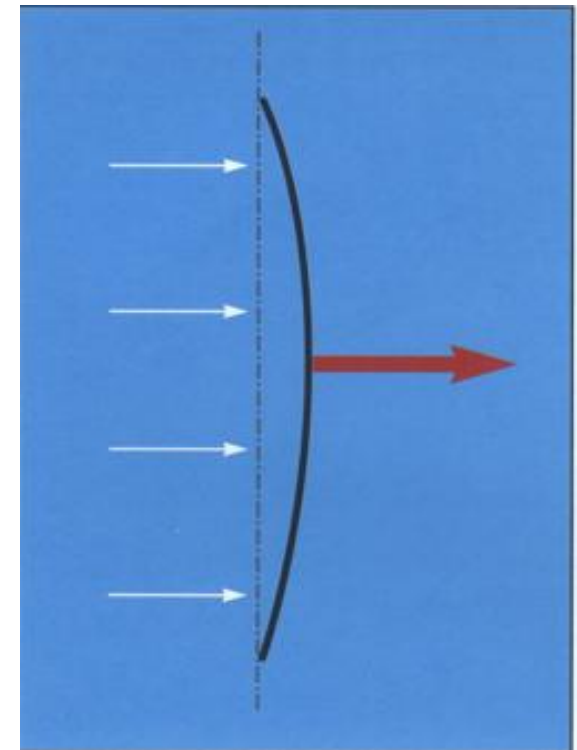
Now watch this video from WB-Sails showing a Star bearing away.

<https://www.youtube.com/watch?v=8iRj6aLeCBQ>

In small angle of attack $\alpha=12^\circ$ - 25° the point of action for the driving force is approximately $1/3$ from the forward part of the string and the force is inclined forward

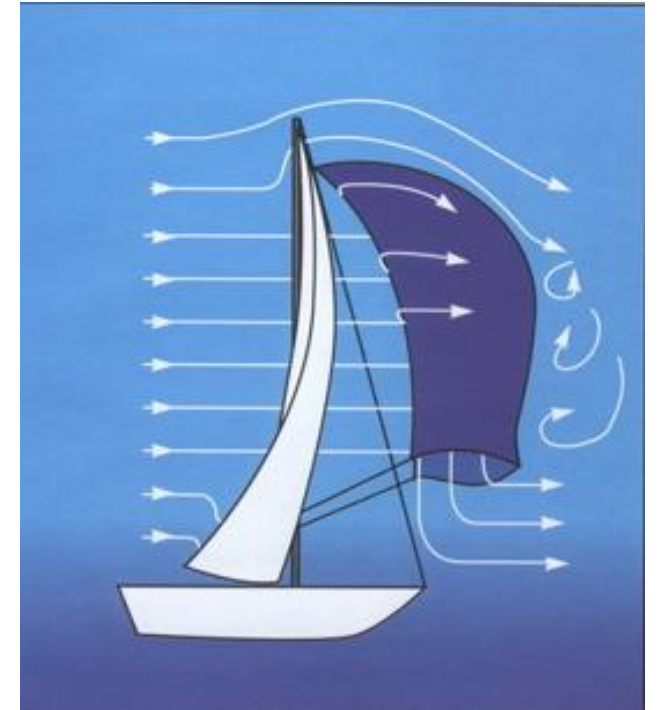
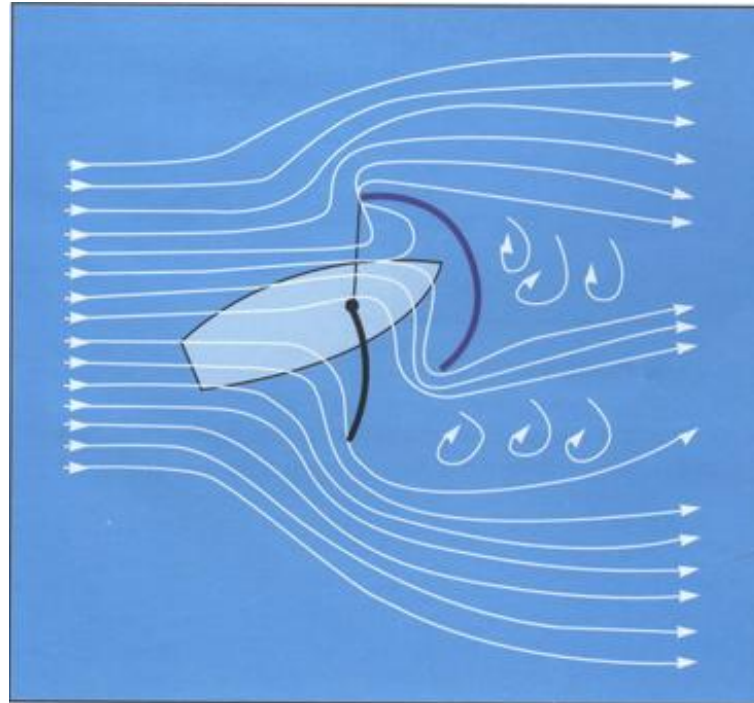


When the angle of attack is getting bigger the point of action is moving towards the center of the string.
So when going downwind the angle of attack is 90° the aerodynamic force is vertical to the string and the point of action is in the center

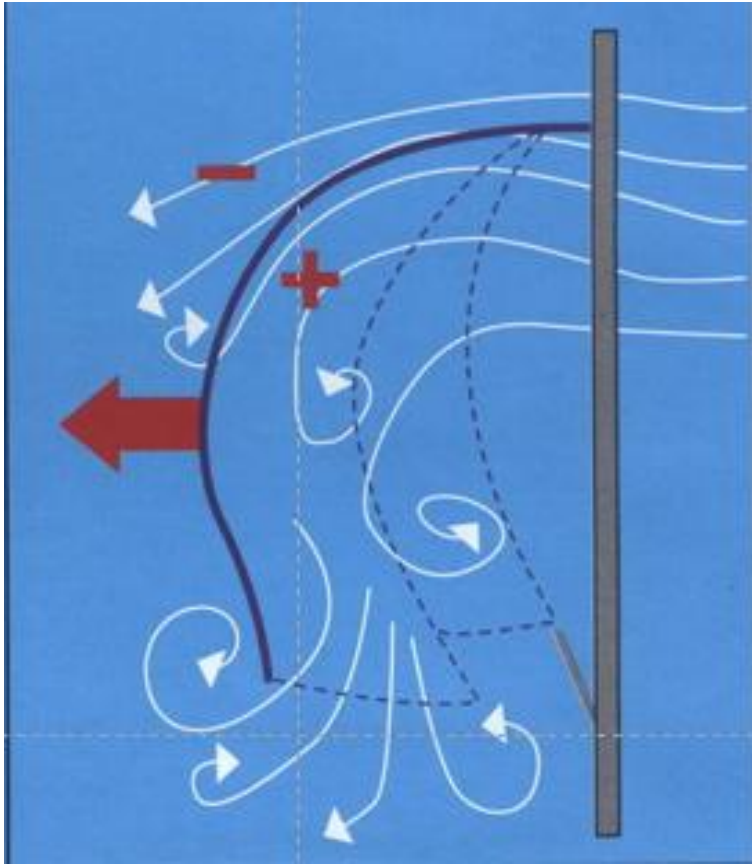


The Spinnaker

If we were able to see the wind this is what we were able to see



The Spinnaker



- SUCTION

+ PRESSURE



Vorticity

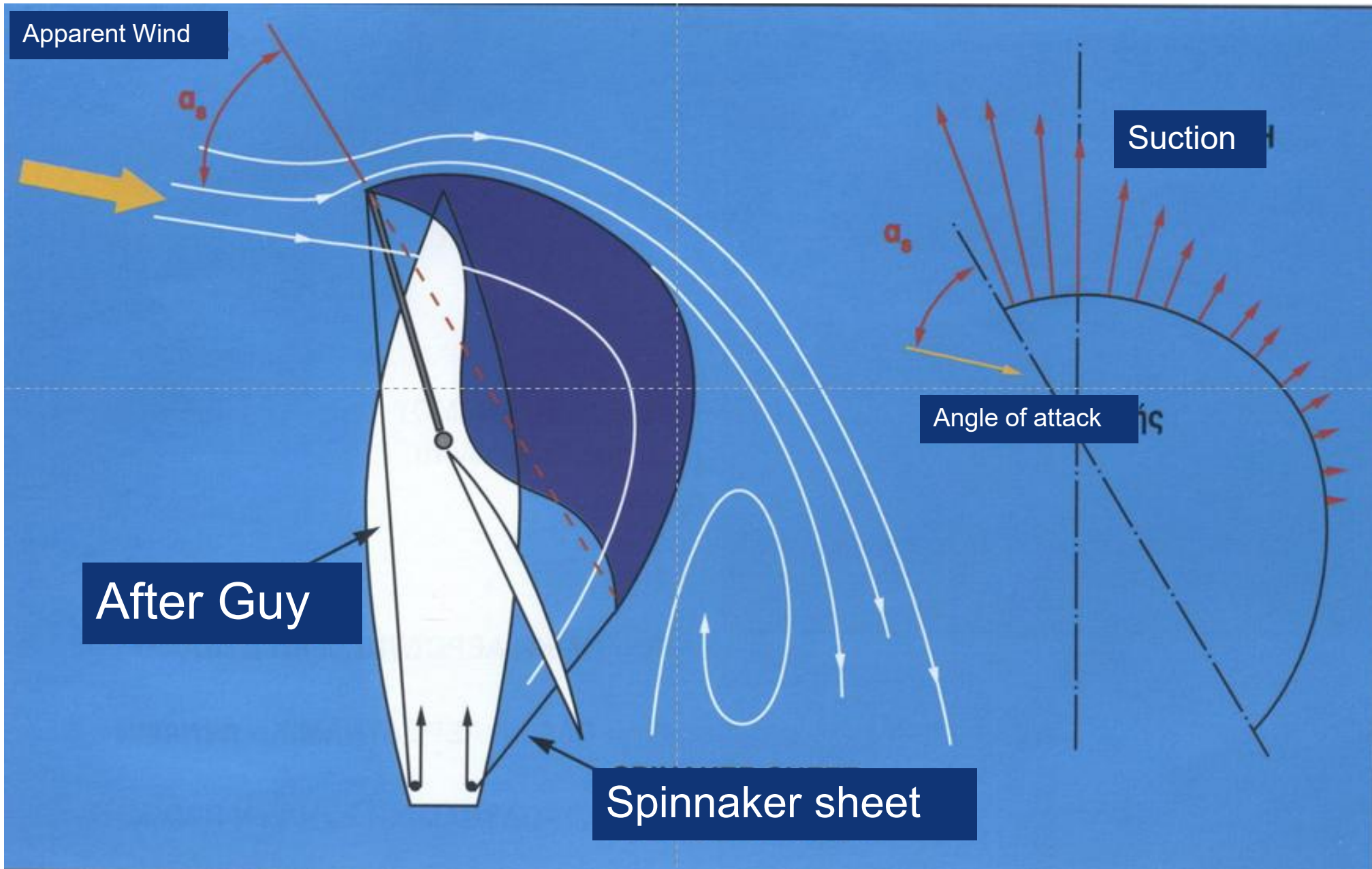
Watch this video from WB-Sails showing the Vorticity behind a gennaker.

<https://www.youtube.com/watch?v=yWJFfXGrrwg>

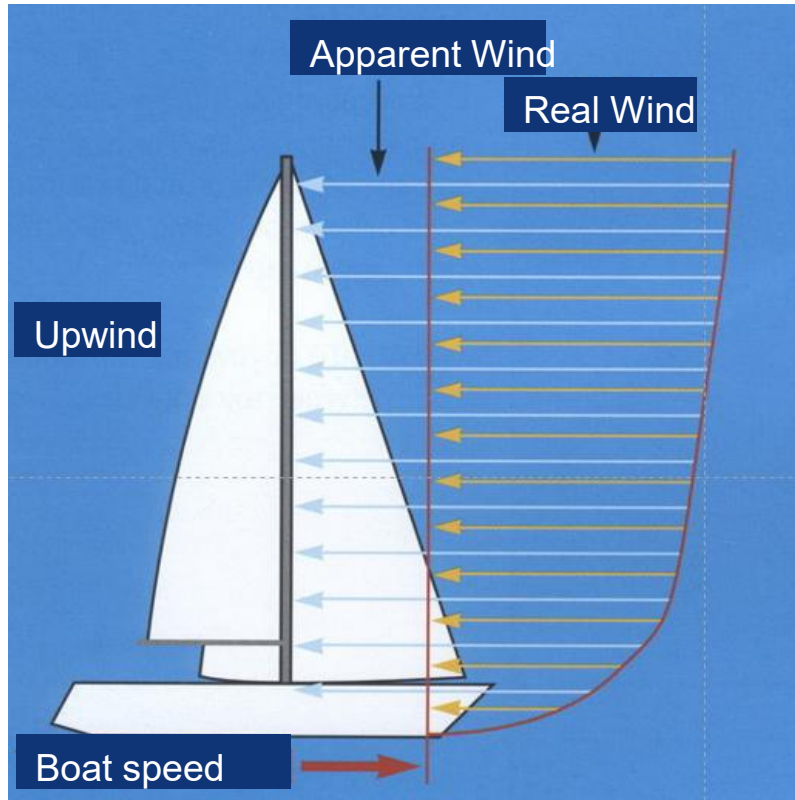
Gennaker Flow

Look now at this video from WB-Sails showing Gennaker flow simulation.

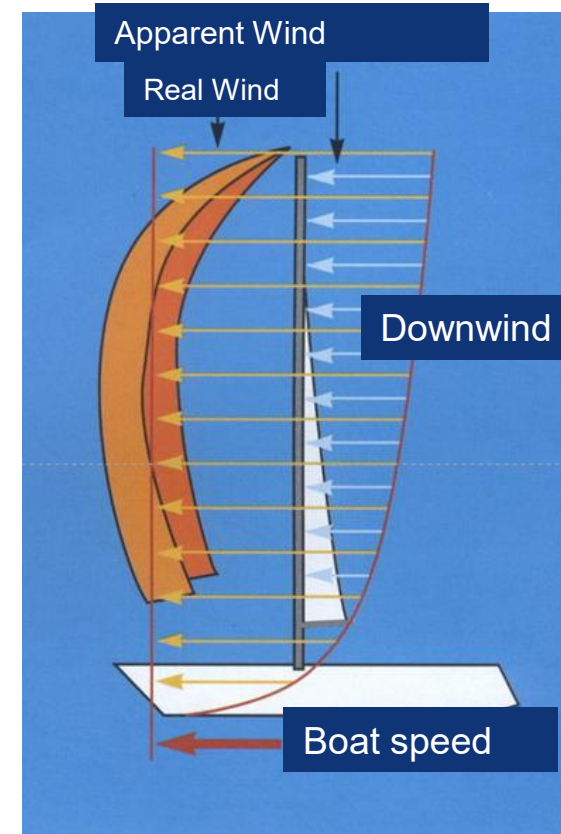
<https://www.youtube.com/watch?v=hb7Mqh4dtFc>



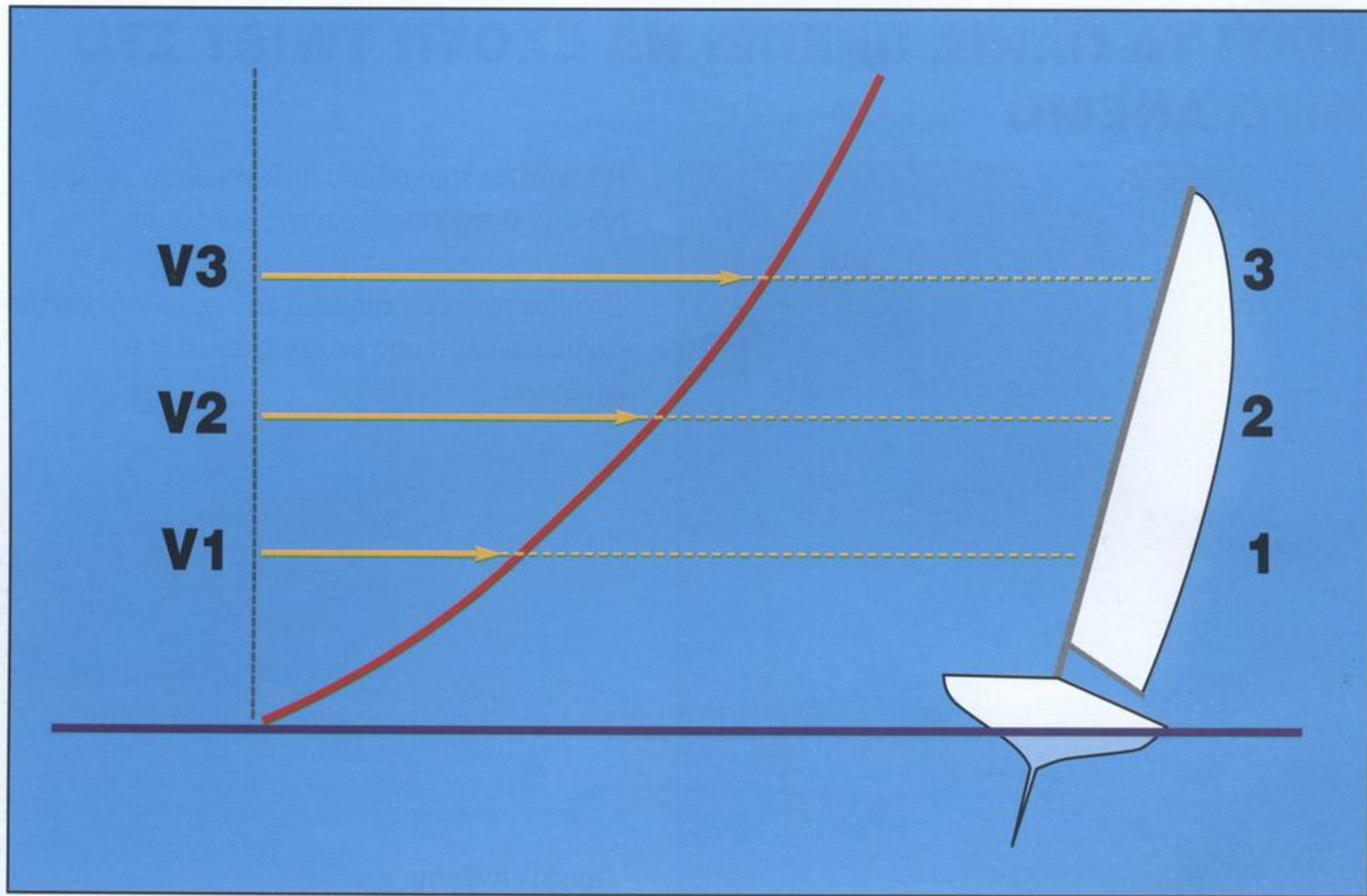
Apparent Wind by height

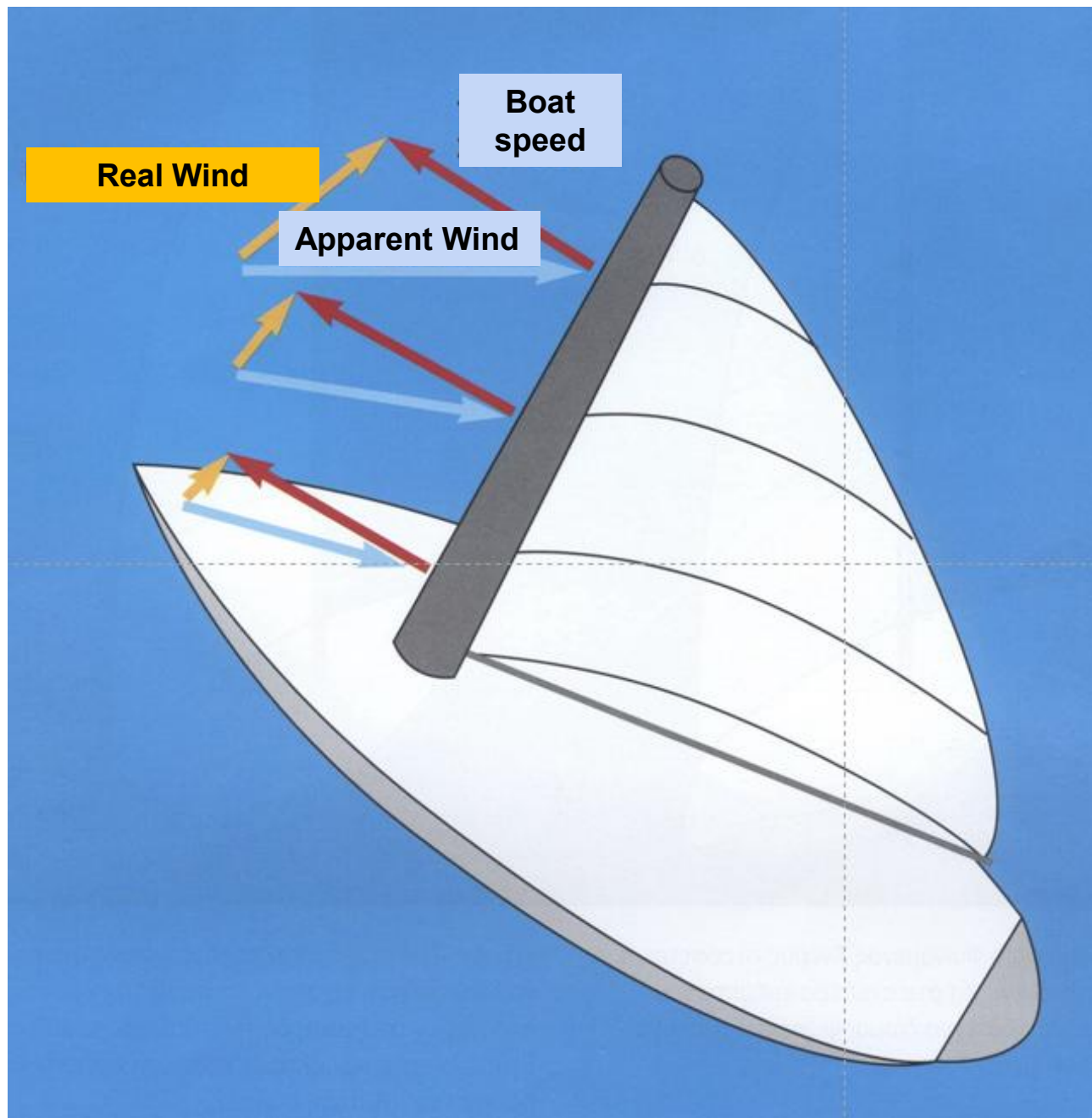


Upwind



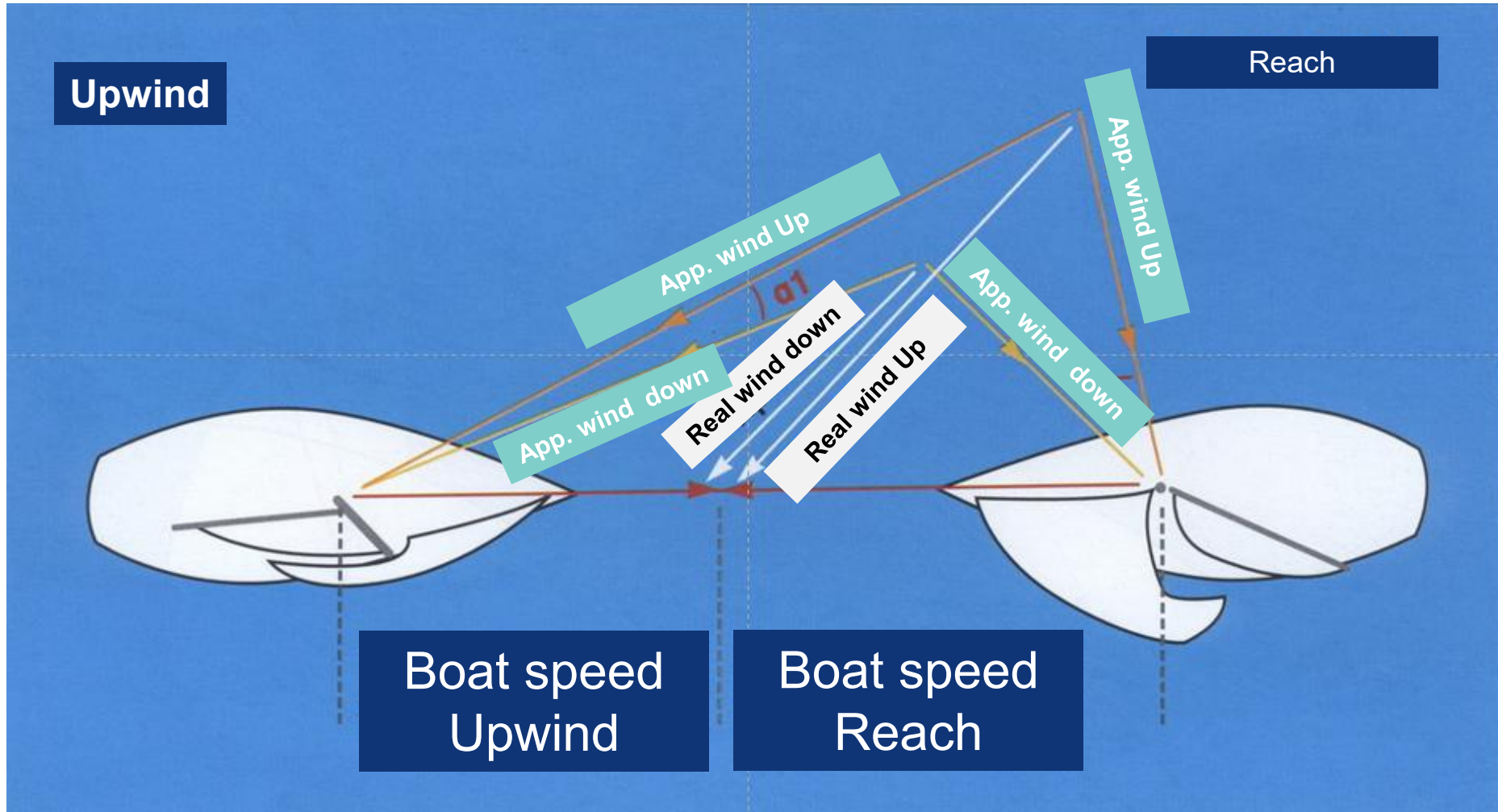
Downwind





**Let's see how
the apparent
wind changes**

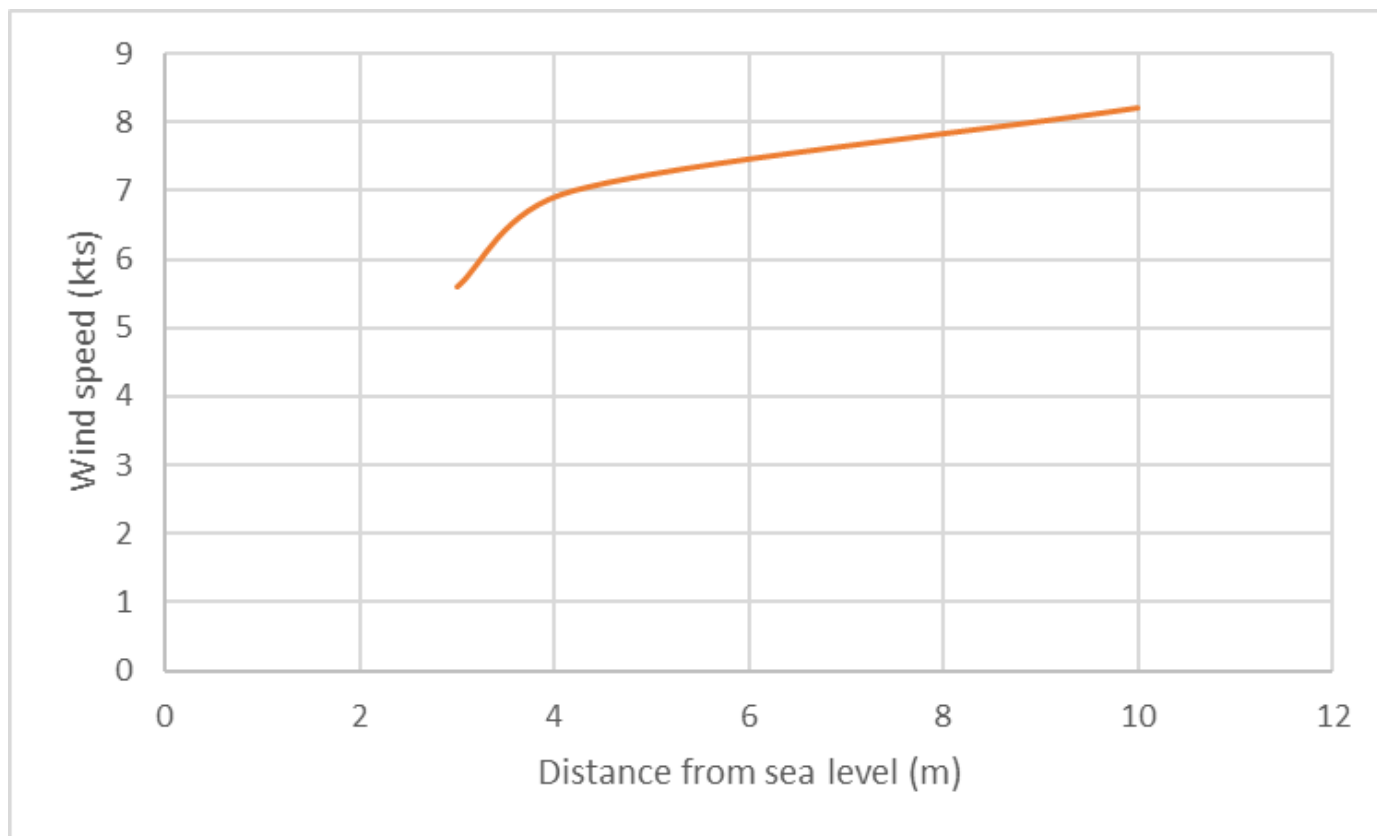
Sail Twist

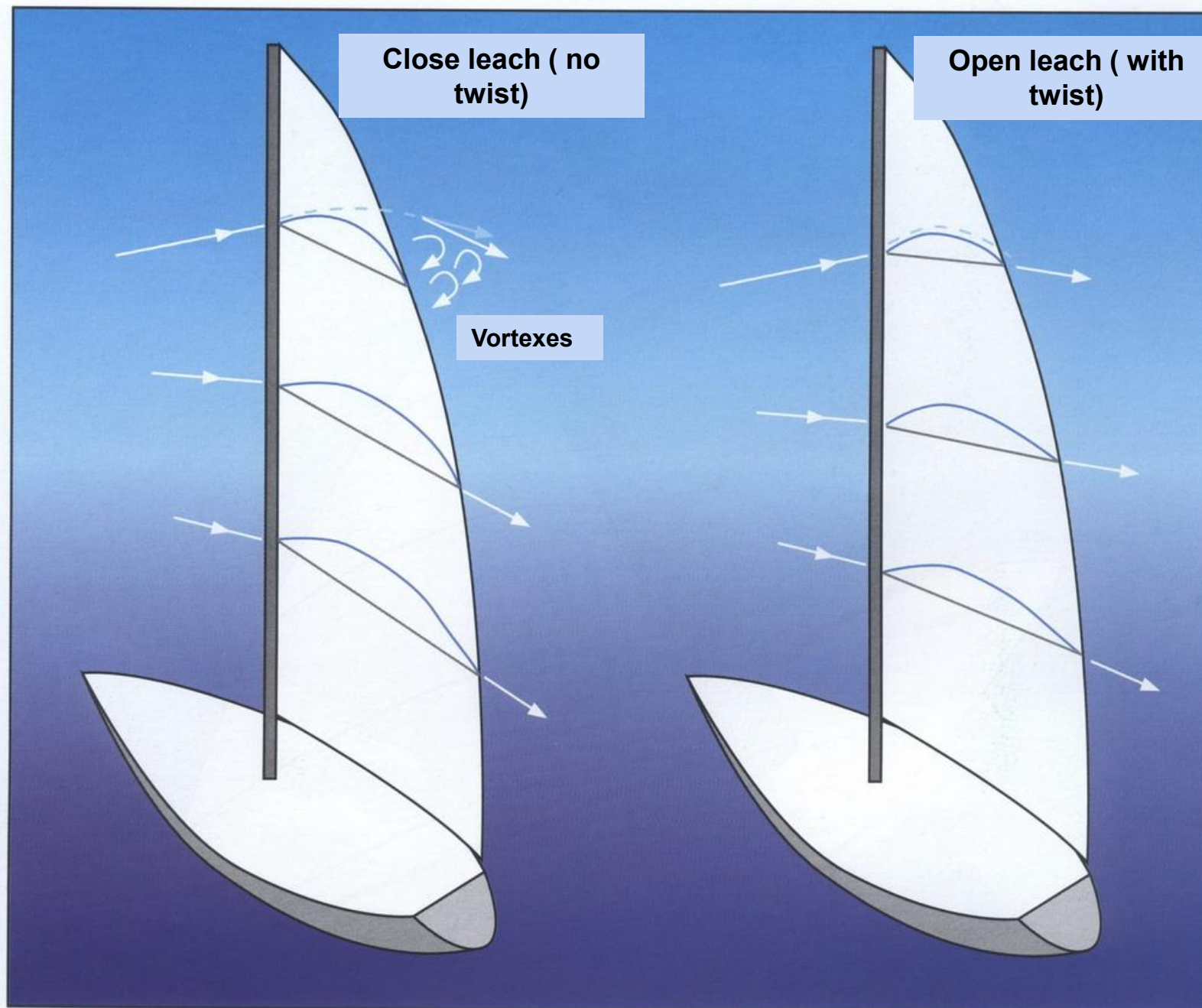


Twist in Low wind

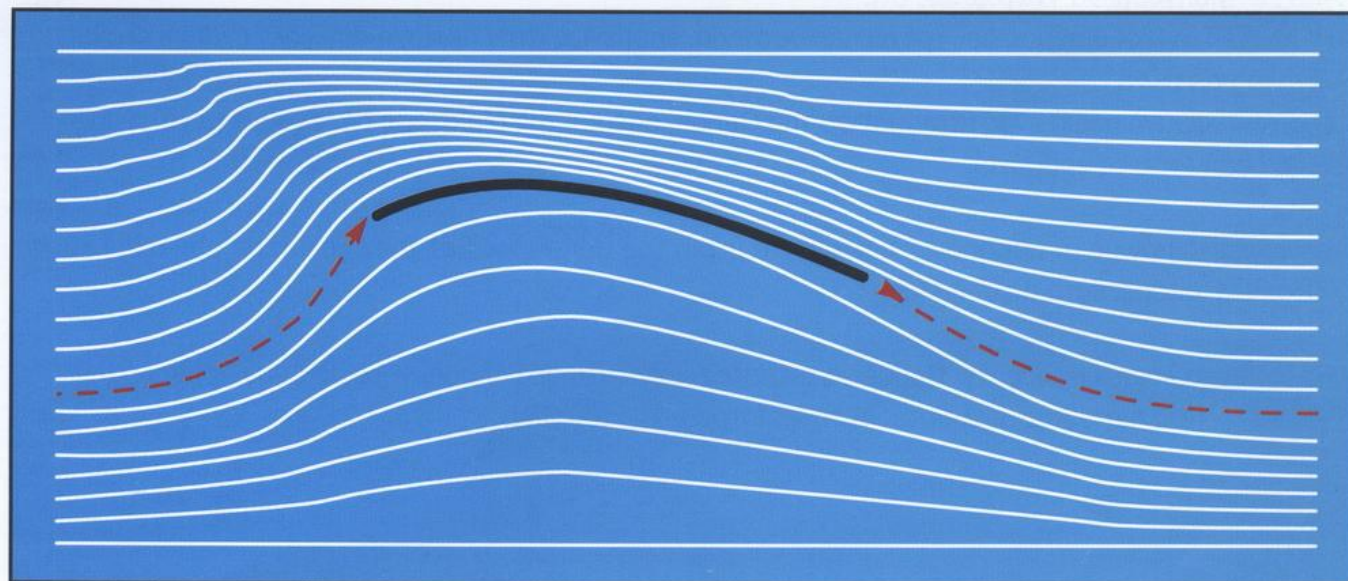
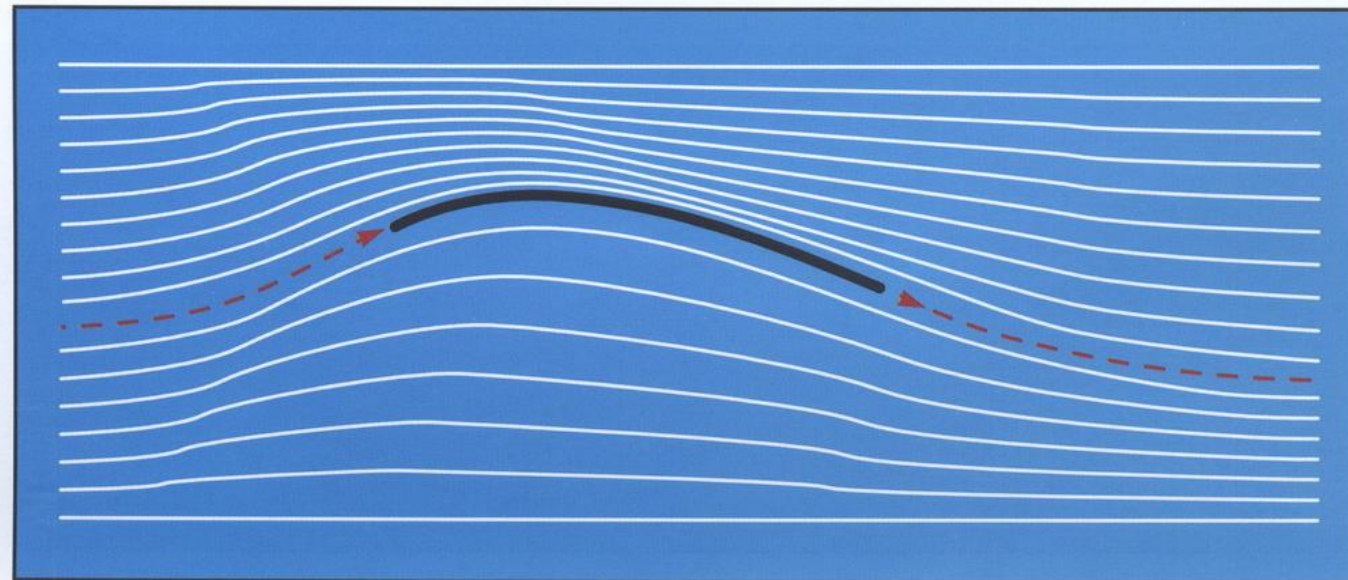
Wind Profile

The wind increases as the distance from the sea level increases

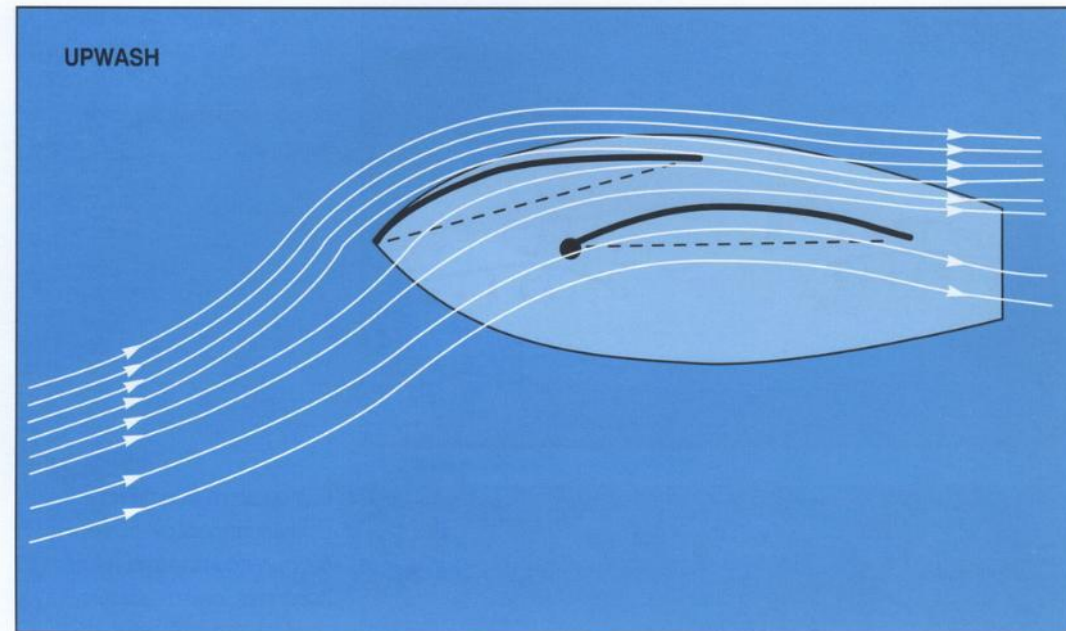
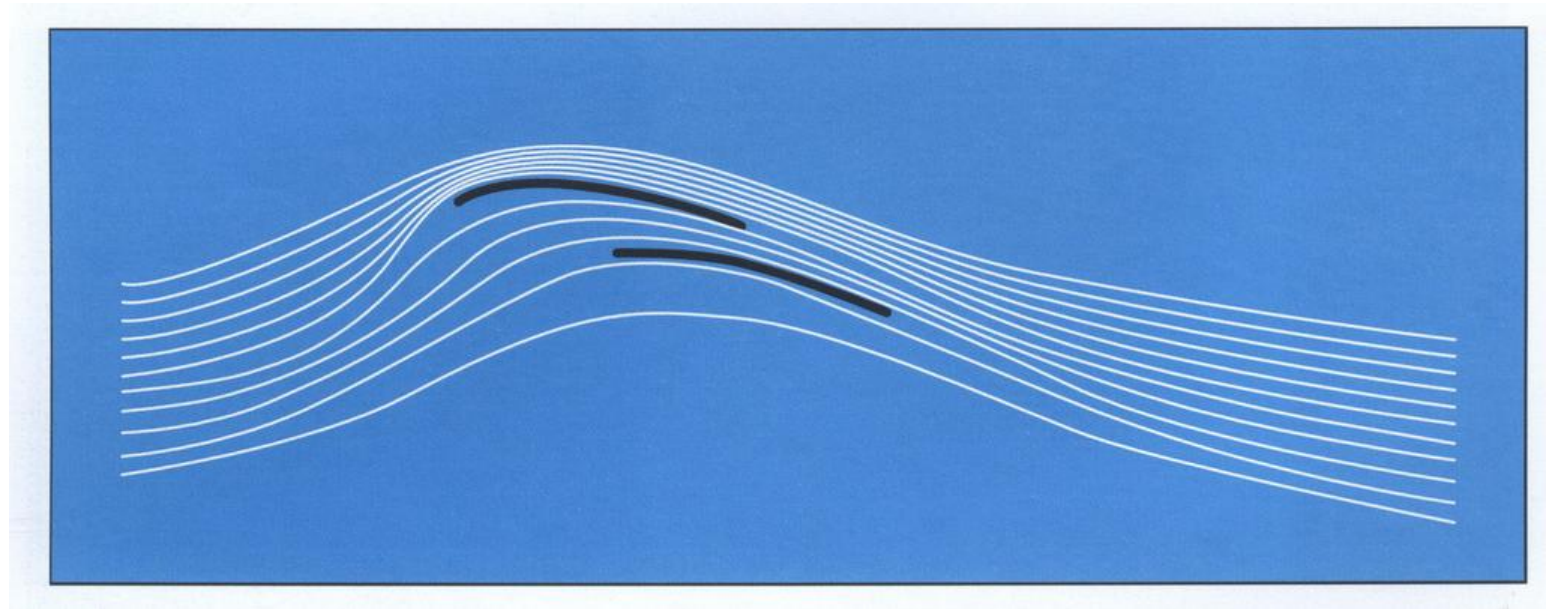




The airflow on the sail



The airflow with two sails



Sailing Aerodynamics

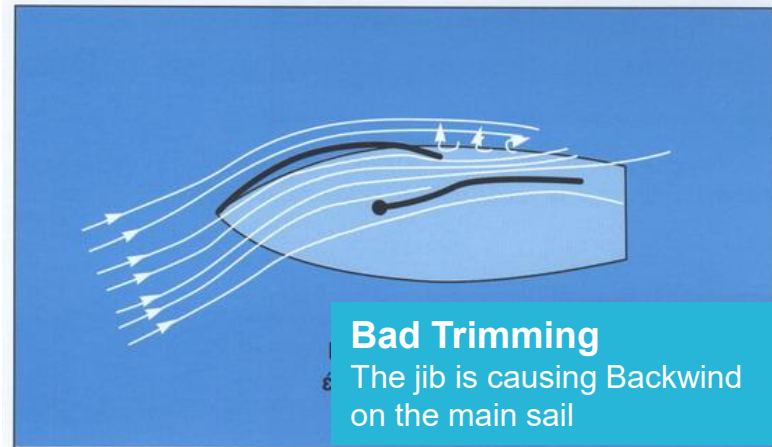
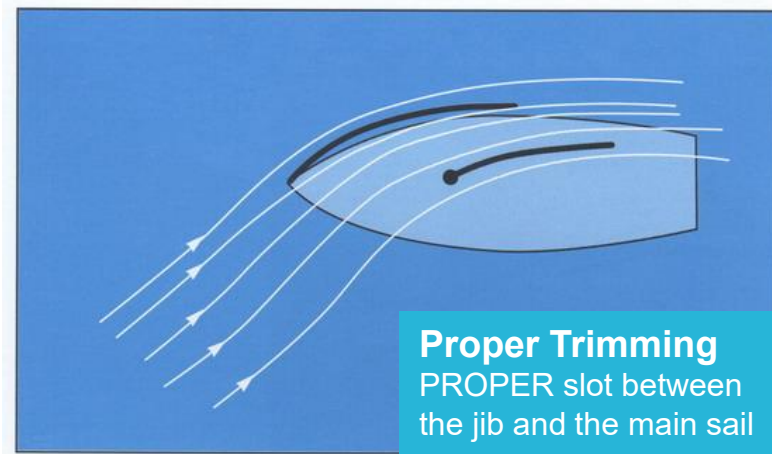
Look at this video from WB-Sails showing a 470 sailing upwind in waves and downwind under spinnaker.

<https://www.youtube.com/watch?v=hb7Mqh4dtFc>

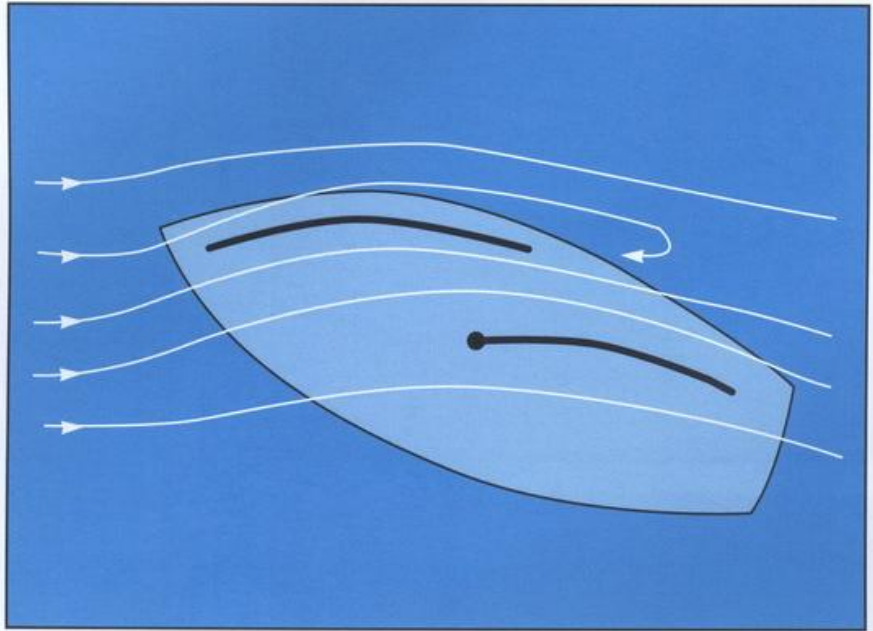
Proper Trimming

Bad Trimming

Bad Trimming

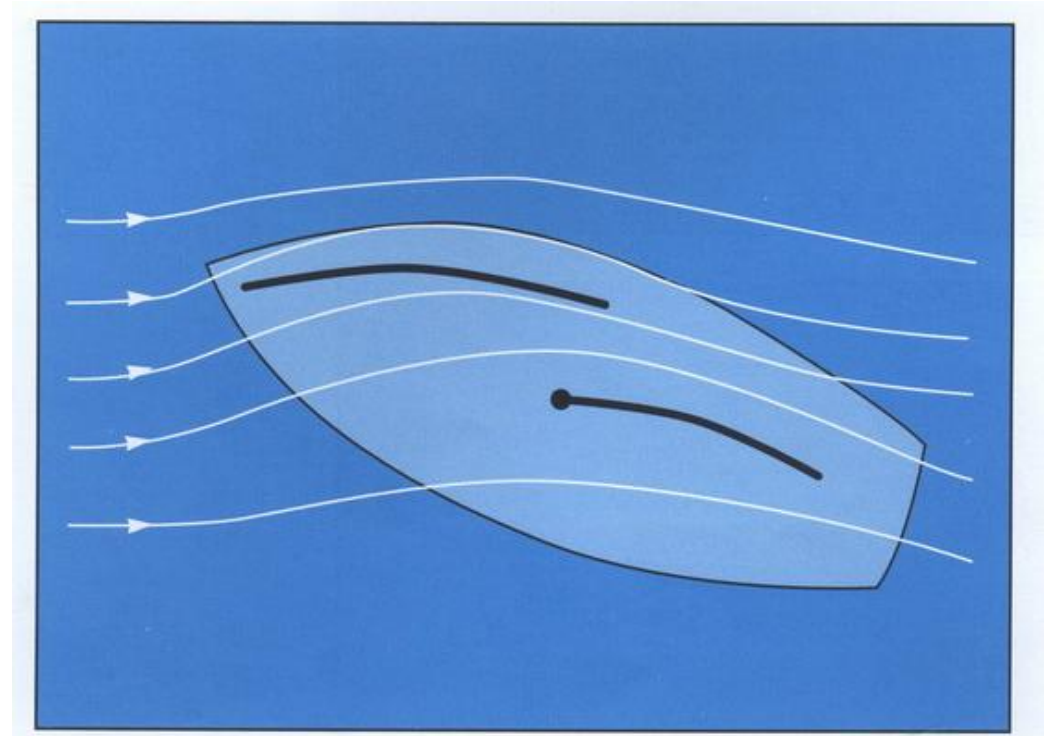


Barber Haulers – The Slot Jib Main Sail



Bad Trimming

Creation of vortices resulting in the lost of pressure suction



Proper Trimming

PROPER slot between the jib and the main sail facilitates the airflow from the exit of the jib and the leeward side of the main sail

How to trim – The control systems

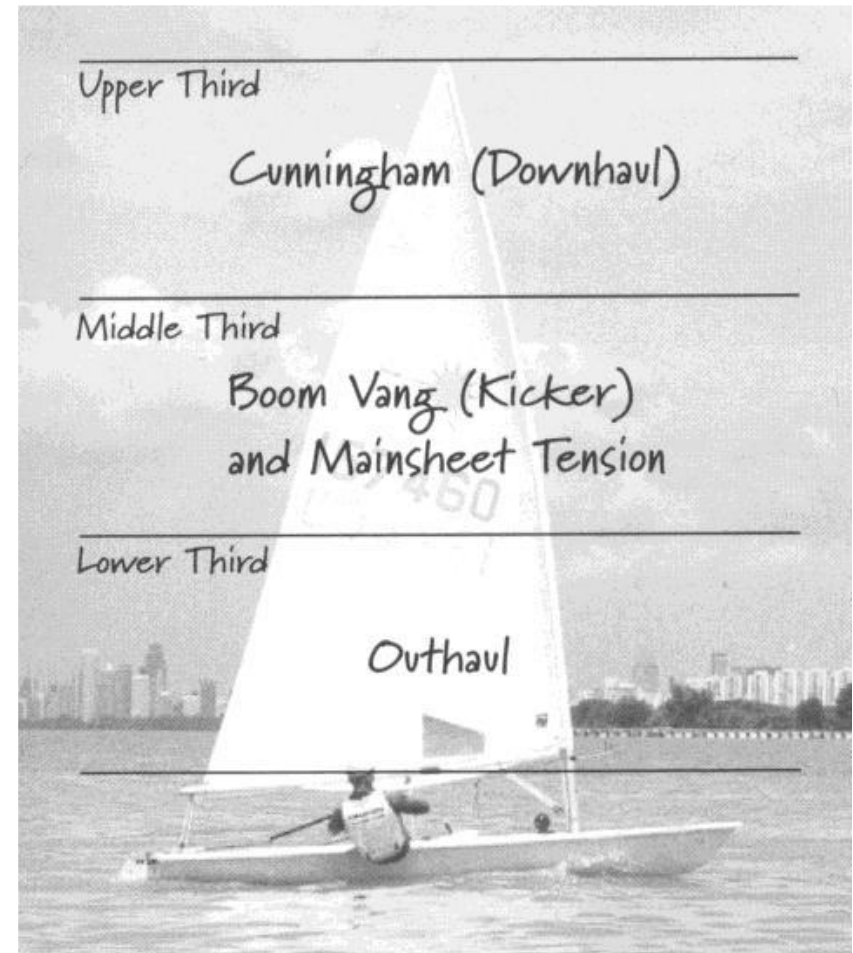
Top 1/3 is controlled by the cunningham



The middle 1/3 is controlled from boom vang and main sheet

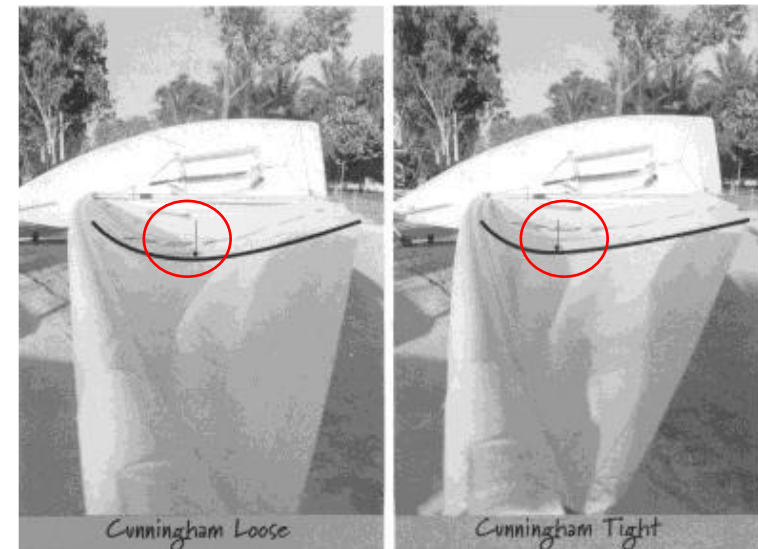
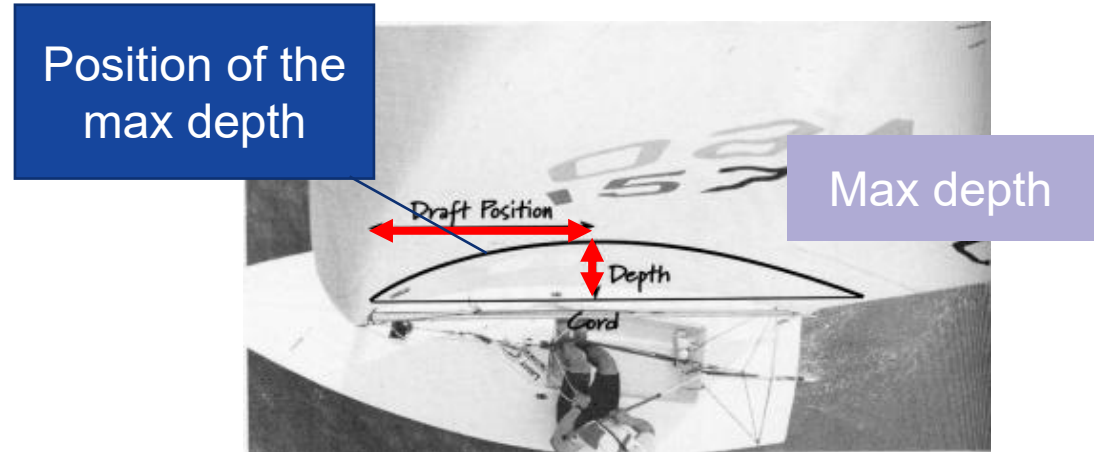


The lower 1/3 is controlled by outhaul



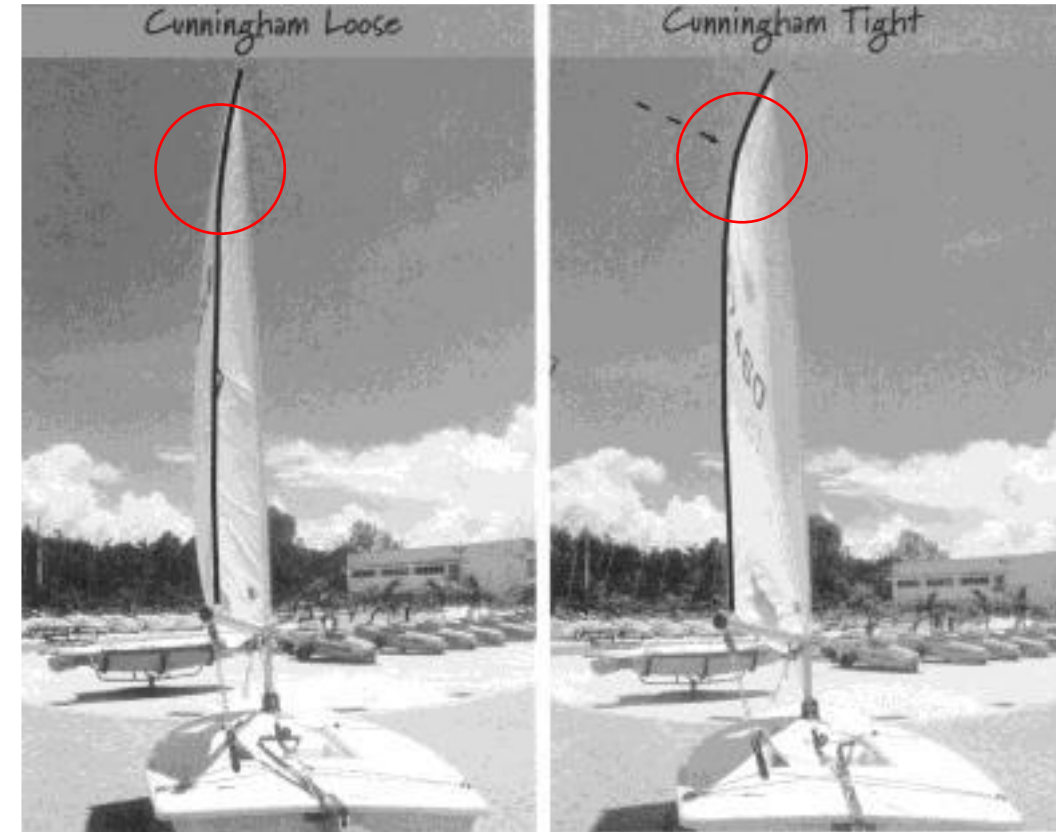
How to trim the ILCA Sail – The Cunningham

- The primary job of the Cunningham is to control the position of the maximum depth
- By pulling the Cunningham the maximum depth moves forward
- With loose Cunningham the maximum depth moves backwards



How to trim the ILCA Sail – The Cunningham

- The secondary job of the Cunningham is to control the top part of the leach
- By pulling the Cunningham the top part of the leach opens
- With loose Cunningham the top part of the leach is close
- By pulling the Cunningham the max depth moves forward and the top part of the leach opens
- By loosening the Cunningham the max depth moves backward and the top part of the leach closes



How to trim the ILCA Sail – The Cunningham

By pulling the Cunningham the max depth moves forward, and the top part of the leach opens.

What Happens?

- The boat accelerates faster, is easier to handle and the tiller is “light”
- The boat is balanced easier and moves through the waves more easily
- The boat loses upwind angle, and it has lower final speed
- The sail loses power necessary in the medium wind



How to trim the ILCA Sail – The Boom Vang

What happens when we pull?

- It starts bending the mast starts from the lower part
- Stretches and opens the whole leach
- It decreases the wind angle of attack in the lower part of the sail

What happens to the boat?

- The boat is balanced easier **in strong wind**, the tiller is “light” and the boat has more speed
- In light wind conditions give the proper shape to the sail and with better upwind angle
- Control the shape of the sail reaching and downwind
- Downwind with strong wind it gets the boat stable
- When we lose it in medium wind the boat gets more power

How to trim the ILCA Sail – The Outhaul

The Outhaul Controls the lower part of the sail by making it deeper or flatter

Why its important?

- It is necessary to loosen it in light wind and big waves as these actions will give the necessary power to climb the waves
- When not set properly upwind the sail doesn't have a good shape therefore the boat won't have good upwind angle and speed

How to trim the ILCA Sail – The Outhaul

Light wind



Strong wind

