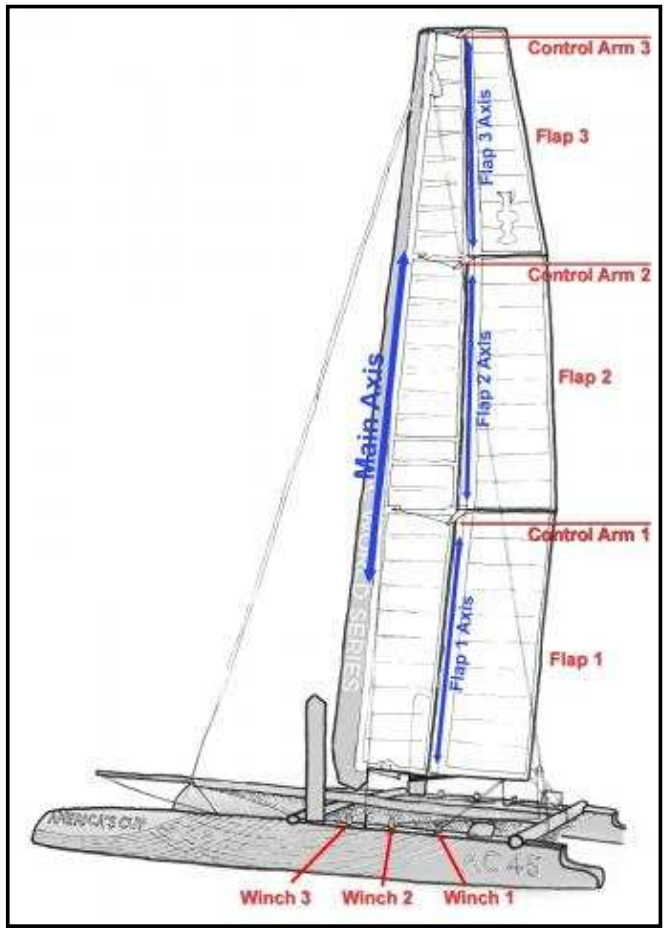
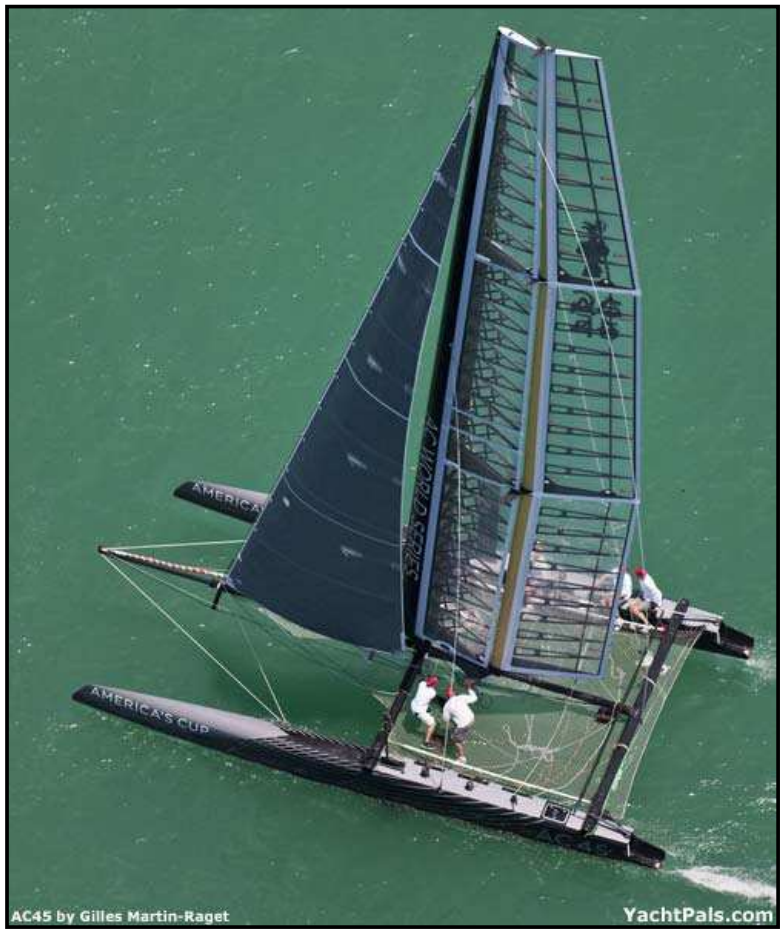
Why Wings?
By: Peter Schwarzel





AC45 Catamaran

Why is an AC45, 45 foot long?

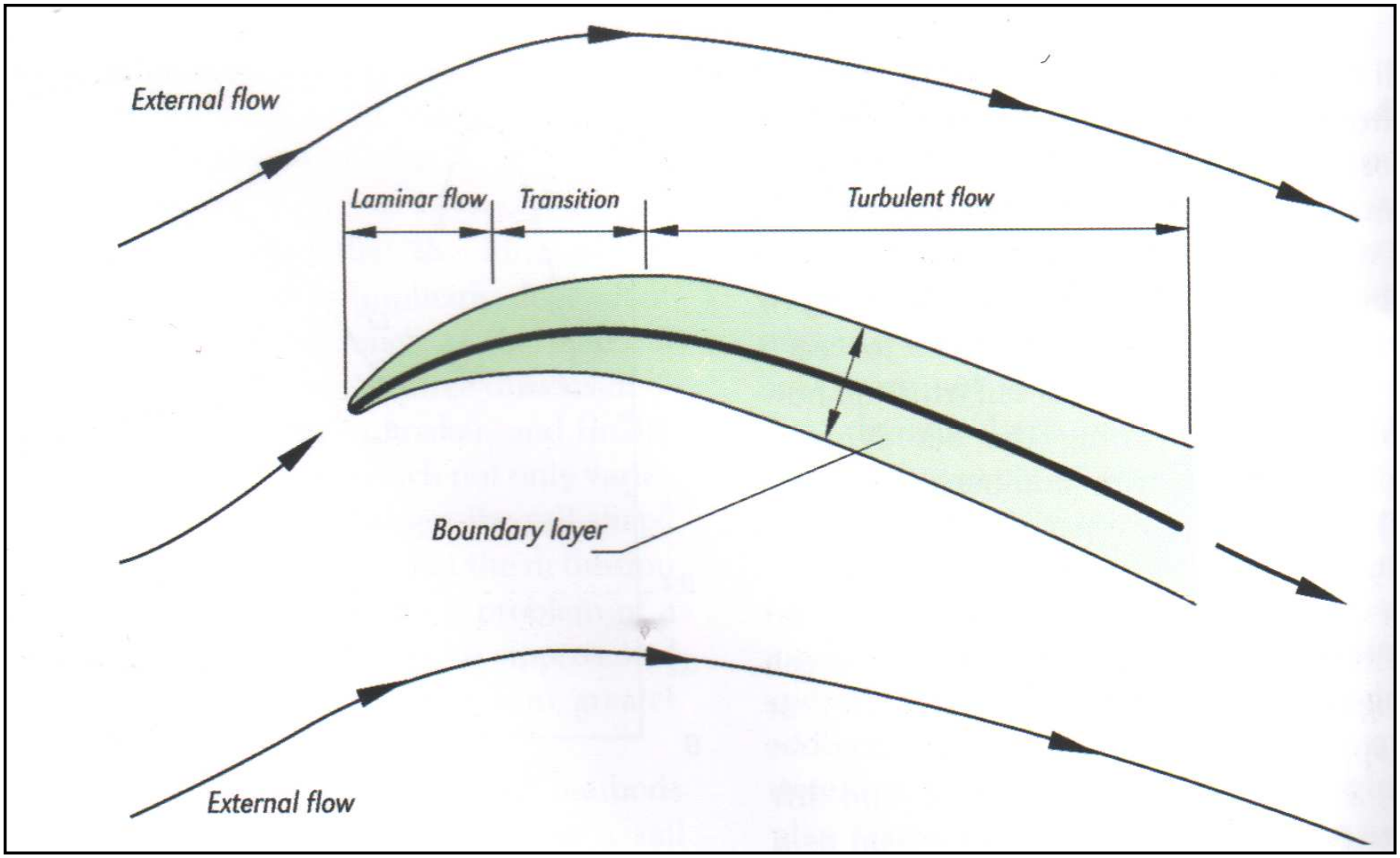
What do Cole sausages and the AC wing have in common?

Quick Points

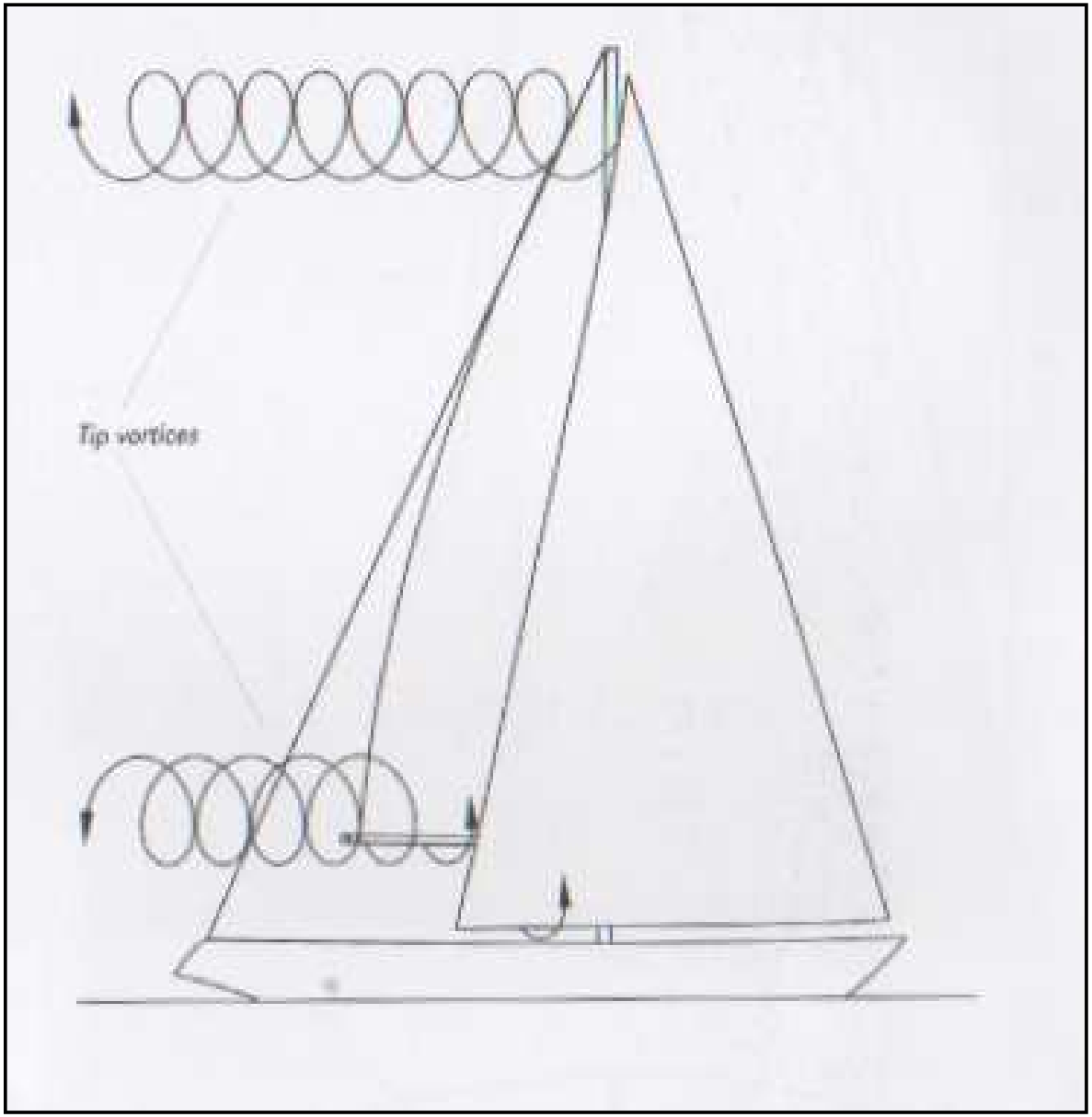
- **Wings**
- If the racing rules allow Wings are faster, therefore racers will use them. This has been proven in C-Class cat racing
- They are currently under-developed but will get better over time
- They are easier to trim and are especially easy to depower
- The ideal aero shape can be designed into a wing
- They have far less drag and much more lift. This means the boat can point higher
- Given a fixed sail area rule the wing is faster downwind & upwind
- Lift Coefficients 2.0 to 4.0

- **Soft Sails**
- Large soft sails produce huge loads which are beyond the sailor's ability to control manually. They require hydraulic controls. USA17's soft sail had 35 tonne mainsheet loads. Its wing sail had 3 tonne sheet loads.
- Change shape under aero loads and become difficult to control in high winds
- Flutter when hove too and create considerable drag and potential damage
- Cannot create as much camber as a Wing. The more camber, the more power
- Lift Coefficients 1.0 to 2.0

Aerodynamics



Boundary Layer Effects



End Losses (or tip losses)

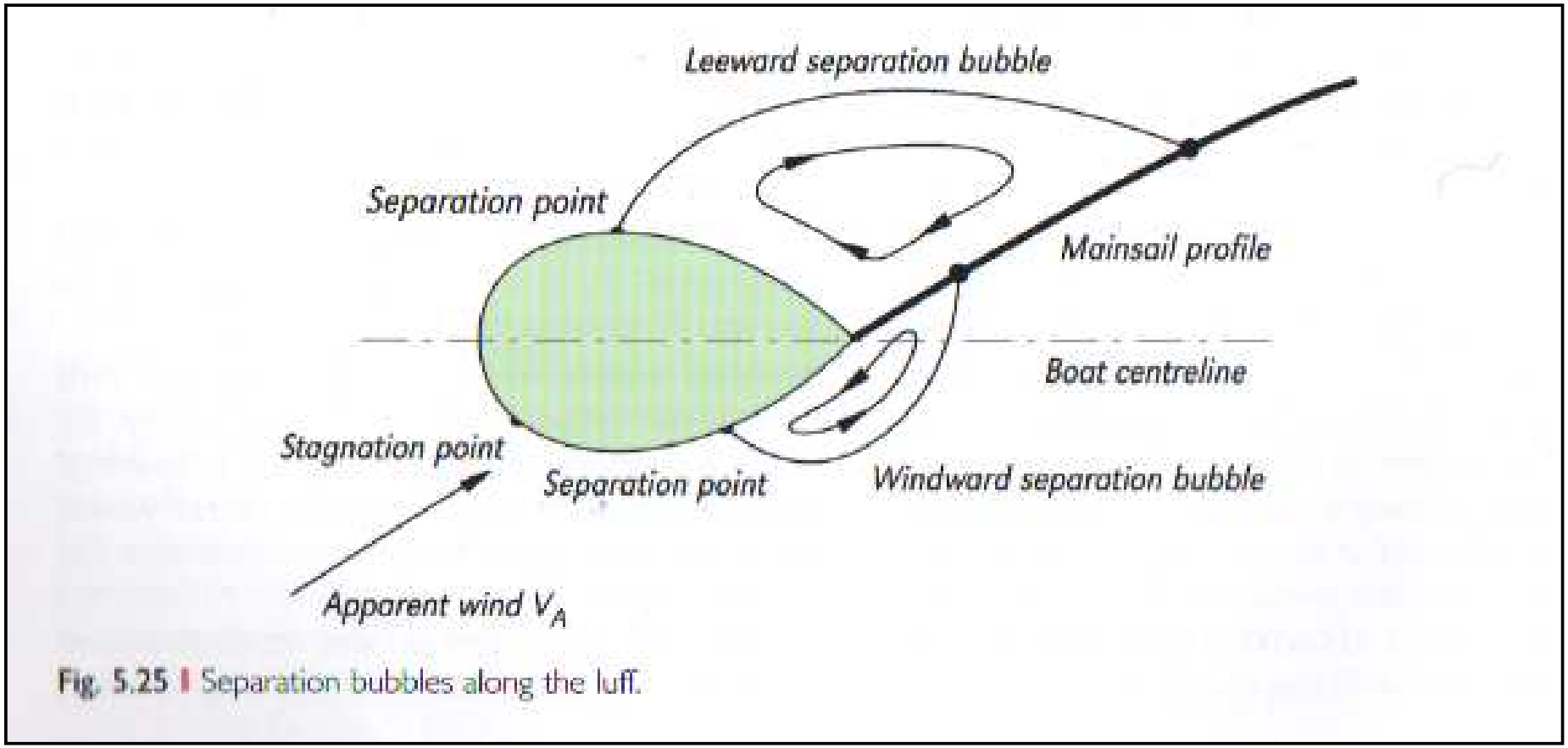
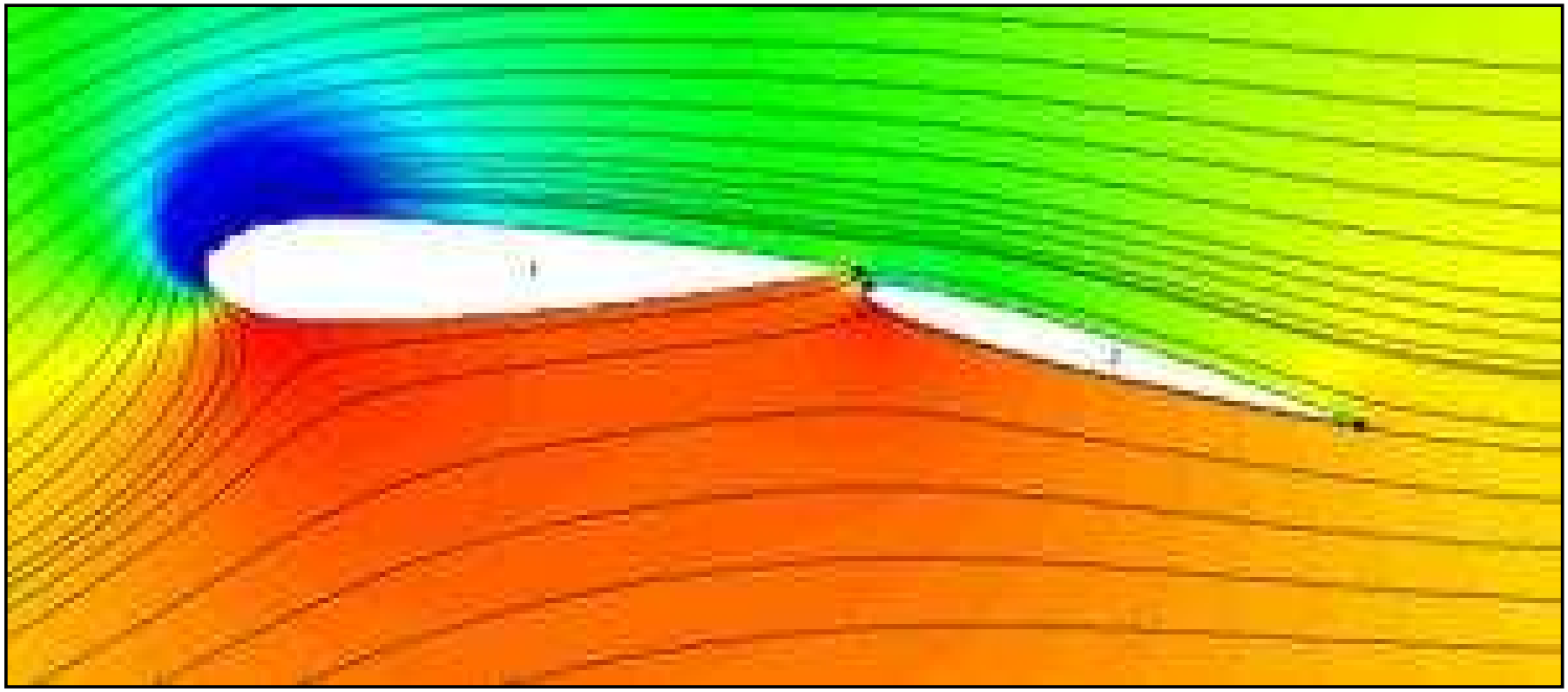


Fig. 5.25 | Separation bubbles along the luff.

Conventional Mast Sail Combination produces vortices which lose considerable energy



Aerofoils produce very little vortices which improves lift and decreases drag.
Wings can be cambered more, up to 40degs and as they hold their shape keep producing lift through the entire camber range.
Plus they can be sailed very flat yet still produce lift.

Why 45 foot long?