

The Amateur Yacht Research Society

Some Members' Projects

Self Trimming/Self Tending Wingsails

by Peter Worsley

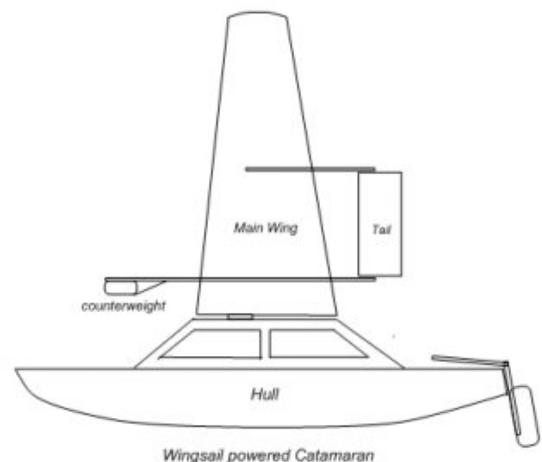
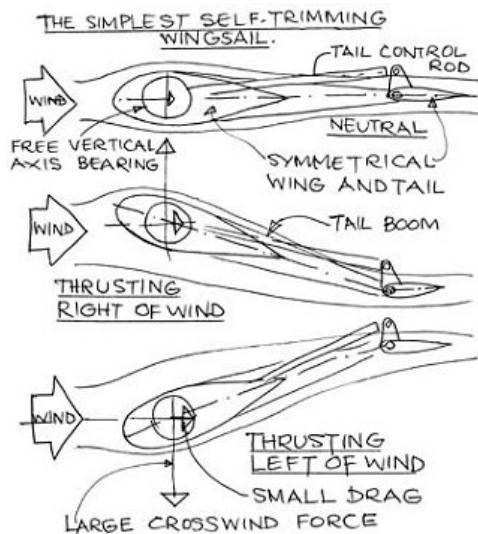
The thrust to drive a boat comes from the “lift” produced from a wing similar to an aircraft wing, but mounted vertically like a sail. Also in a similar way to aircraft, the wing is controlled by a smaller “tail” mounted usually behind the main wing. Just as an aircraft tail is able to control the exact angle of attack of its wing – the tail on the wingsail system is able to control the thrust obtained from the wind and will automatically take into account any changes in wind direction.

Unlike conventional sailing, there is no “sheet” necessary to control the wing, it controls itself automatically all the time. The only control necessary is to set the angle of the tail to accept wind from one side of the boat or the other.

If the wind is very strong the thrust of the wing can be reduced as necessary to a point known as “neutral” where there is no thrust at all. This performs what would be the function of “reefing” a conventional sail.

These rigs can be left up in all conditions, they weathercock and the windage is less than a conventional mast.

One of the most prominent self-trimming wingsail boats, a Walker Wingsailer has survived passages through a hurricane without lowering the rig.



Surprisingly, in tests I have found that a simple symmetrical section wind gives very good performance and I believe that a more complicated wing with leading or trailing edge flaps is not really worth the effort to construct since more area can be added if necessary.

Advantages

- A self-trimming wingsail unit does not have to be lowered or raised in any conditions.
- Control is by a simple lever for left/tack or right/tack. (Or automatic system).
- Because the wing is perfectly balanced, there are no heavy forces to control, winches, pulling on ropes etc. “fingertip” control is possible.
- Simple, (non computerized) automatic control is being developed, resulting in a system so simple, that all is required is an on/of switch! (Note: computerised control is certainly an option, but to keep things simple, I am not considering it at this stage).

AYRS - Where the ideas are !

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