

3 VPP Methodology

The VPP has a two-part structure comprised of the solution algorithm and the boat model. The solution algorithm must find an equilibrium condition for each point of sailing where:

- a) the driving force from the sails matches the hull and aerodynamic drag, and
- b) the heeling moment from the rig is matched by the righting moment from the hull.

i.e. balance the seesaw in *Figure 1*¹⁰, and optimize the sail controls (reef and flat) to produce the maximum speed at each true wind angle.

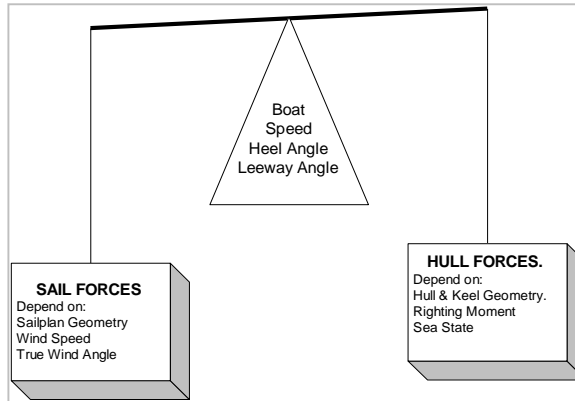


Figure 1 - Force Balance See-saw

3.1 Solution Method

The VPP determines the steady state conditions by satisfying 2 equilibrium equations:

Firstly the net force along the yacht's track (its direction of motion) must be zero,

$$(i.e. \text{Driving Force} - \text{Drag} = 0)$$

Secondly the aerodynamic heeling moment produced by the mast & sails must be equal and opposite to the righting moment produced by the hull and crew.

$$(i.e. \text{Heeling Moment} - \text{Righting Moment} = 0)$$

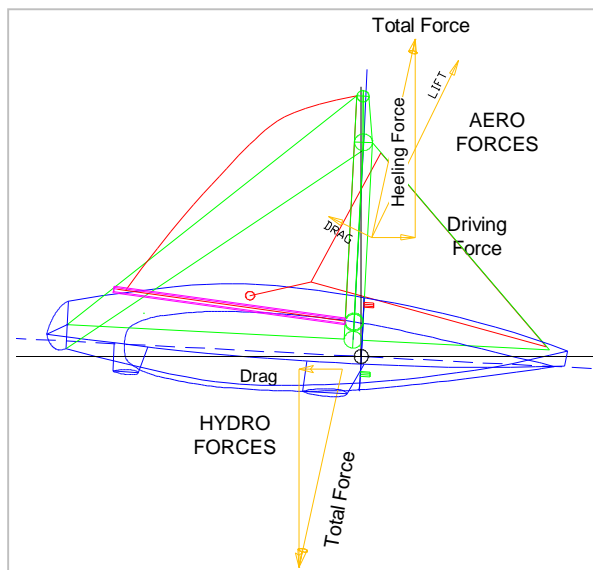


Figure 2 - Force balance in the plane of the water surface

¹⁰ Milgram 1993