clination will continue until the force which causes it is de­stroyed by the moment of the hydrostatical stability gene­rated by the inclination. From this, Bouguer concludes that it is only when the masting is of such a height that the direction SK intersects DH at a point at some mean dis­tance between the bows and stern, and at which neither of these effects will be produced, that the ship will have no tendency to longitudinal oscillation, and the only effect of the force NT will be to lessen the part of the ship which is immersed in the water when she is at rest ; and this point he has called the *point velique.* Bouguer determines the position of this *point velique* in the following man­ner. From *r*, the centre of gravity of the load water-sec­tion, as being nearly coincident with the centre of gravity of the lamina, AB*ba*, of the vessel which is lifted by the action of the force NT, the vertical line VT is drawn, and the point N in which it intersects the direction of the re­sultant of the resistance of the water to the bows will be the point through which the horizontal line SK, represent­ing the direction of the action of the wind on the sails, should pass, in order that the ship may move in the direction of its course without a depression of either extremity. In order to prove that this will be the case, he supposes the displace­ment ABFE of the ship to be made up of the two homo­geneous parts AB*ba* and *ab*FE ; and therefore, when the ship is only subjected to the vertical pressure upwards of the fluid, these parts will have their common centre of gra­vity, which will be the centre of gravity of the displace­ment, in the same vertical plane with the centre of gra­vity of the ship. The horizontal distances of *r* and the centres of gravity of the homogeneous parts AB*ba* and *ab*FE, from the vertical section in which the centres of gravity of the ship and of the displacement are, will be inversely as those parts ; but when, by the action of the force NT at *r*, the displacement is diminished by the quantity AB*ba*, the vertical pressure upwards will be dimi­nished by that same quantity, and will act at *w,* the centre of gravity of the new displacement *ab*FE, with a force equal to the weight of *ab*FE ; therefore, the forces being in­versely proportionate to the distances of their action from the common centre of gravity of the ship, and both acting upwards in a vertical direction, will maintain the ship in equilibrio round that centre of gravity. This reasoning of Bouguer on the position of the point N is incorrect in its application to practice. It depends on the supposition, that when by the force of the wind motion is communicated to the vessel, she will rise in the water from the effect of the action of the force NT, and the water-line AB will become *ab,* the displacement being diminished by the quantity AB*ab*. It is not enough to satisfy the conditions of Bou­guer’s reasoning, that NT should exert an effort at *r* equal to diminishing the displacement by the quantity AB*ba* ; for unless the diminution of the displacement actually takes place, the position of its centre of gravity cannot be affect­ed in the manner assumed in the reasoning, but will con­tinue in the vertical section passing through the centre of gravity of the ship ; and then, by the action of the force NT at *r,* the ship will revolve round the centre of gravity *g.* until, by the motion of the centre of gravity of the dis­placement, incidental to the revolution, a moment of hydro­statical stability is generated equal to the moment of NT to incline the ship. Now it is proved from experiment that the displacement is actually greater when a ship is in motion than when she is at rest; therefore, reasoning on the supposition of its diminution is inapplicable to practice. There would be an alteration in the position of the centre of gravity of the displacement resulting from this increase, which might either act in opposition to, or with the effect of NT, to incline the ship, according to the relative form of the body above the original water-line.

But it is evident that the principal error made by Bou­guer throughout the investigation of the position of his *point velique* is, that it is conducted with reference only to the resultant of the positive resistances which the vessel experiences, instead of to the resultant of both positive and negative resistances. Chapman, while he adopts Bouguer’s views on the existence of some limit to the situation of the centre of effort of the sails above the centre of gravity of the ship, has avoided this error, and has investigated its po­sition from the data of the total resistance experienced by the ship. He first determines the quantity and direction of the mean resultant of both the positive and negative re­sistances of the water ; then, since the force of the wind must be equal to the resistance of the water opposed to it, if the directions of the resultants of these two forces were exactly opposed to each other, their moments, estimated from the centre of gravity of the ship, would be equal, and consequently the force of the wind would have no effect in making the ship revolve round its centre of gravity ; there­fore, if the surface of the sail was perpendicular to the re­sultant of the direct and vertical resistances experienced by the ship, there would be no limit, arising from these con­siderations, to the height at which the centre of effort of the sails might be placed ; for, whatever might be its posi­tion in the line of direction of the resultant of the resist­ances of the water, the moments, estimated from the centre of gravity of the ship, would be constantly equal, since the perpendicular distance between that point and the direc­tions of the actions of the forces would remain constant, however the force of the wind, and consequently the re­sistance of the water, might be increased or diminished. But since the directions of the wind and of the course of the vessel are both horizontal, and the sails are placed nearly at right angles to the horizon, the action of the force of the wind, and its moment round the centre of gravity of the ship, to counteract the moment of the resistance of the wa­ter, must be estimated in a horizontal direction ; and con­sequently the height of the centre of effort of the wind on the sails must be measured on a vertical linc drawn from the centre of gravity of the ship, and must be such that the horizontal moment of the wind shall be equal to its mo­ment, estimated under the supposition that its action is in a direction opposed to that of the resultant of the resist­ances of the water, when it will have no tendency to de­press either extremity of the vessel.

Chapman’s investigation is as follows : Suppose DF and EC (fig. 7) to represent respectively, both in quantity and direction, the resultants of the direct and vertical resist­ances against the fore and after parts of the vessel. Produce