line at some distance from both rabbets ; let C be the place of the midship section, and DC the greatest abscissa. Put AB ≡ *l* and DC — *d,* let the exponent of the parabola be­fore and abaft = n, and the displacement = D ; then the area of the parabolic line BD ACB = ——— ∙ *l∙ d,* and the displacement ” -∣ Z’d’B (B representing the breadth) ;

but *dB =* area of the midship section; hence—~^∙ <’ *(area of midship section) —* D (1).

Let E be the middle point of the water-line AB, which we may call the construction water-line, F the place of the centre of gravity in point of length ; let ED, the distance the midship section is before the middle of the water-line, *= k,* and EF, the distance the centre of gravity is before the middle, = *a.* We will now determine the place of the midship section in reference to the situation of the centre of gravity F.

As BCD represents the displacement of the fore-body, and CDA that of the after-body, the moments of these two parts will give the common moment.

The centre of gravity of the parabolic area is at a dis­tance from the abscissa DC

= .7. X the ordinate DB,

2 *η* -f- 4

and for the parabolic area DCA it

= =rrtA da∙

2n -f- 4

The moment of DCB from the point E

= (4+s⅛Vdb)∞b∙

and the moment of DCA from the same point

= (^DA-‘)DCA·

But the areas DCB and DCA are proportional to DB and DA, and the sum of the above moments = EF ∙ BCA, or *a∙ l, l* representing the area ; hence

*αl = (k +* Λ±J DB^DB— 1.∙DA-ήϋΑ *∖, τ 2n* -f- 4 *J ∖2n* -f-4 )

= ~ 2⅛4 (D a' - DB?) + k <DB + DA>

= (DA + DB) ∙ (- - (DA \_ DB) + ⅛) ;

but DA — DB ≡ 2⅝ and DA -f- DB = *l;* hence

∙j=a∙(1-⅛⅛

*a — k‘ —-—, n* + 2’

or *k = a ∙ (n* -∣- 2) (2).

That is, if the midship section DC is placed at such a dis­tance *h* from the middle point of the construction water­line, the centre of gravity will be in the point F assigned to it.

These two equations (1 and 2) form the principal foun­dation of the parabolic method of construction. In the first equation, any quantity may be known by assigning values to the others ; and in the second, by fixing a value for the distance of the centre of gravity before the middle, the place of the midship section will be known. Then, having by the first equation found the exponent of the pa­rabola, any abscissa GH or KL may be calculated. Sup­pose, for instance, GH to be required ; then in the first assigned equation *yn = ax, n* is known ; also *y* and *x* arc

known for a certain point B, through which the parabola passes ; the value of *y* for this point is DB, and of *x* is DC. This gives

DB"

a= DC

= (by cutting DB =∕)j^-....(3).

Now GH is easily determined in the above equation, by assigning a value to CG ; if CG or any other ordinate is expressed by *y',* the corresponding abscissa GH = *x''* is de­termined by the equation

a∕=y-n (4).

This equation is sufficient for calculating the areas of all the sections for the fore-body ; and for those of the after­body we have the equation (3), in which, by substitut­ing *f* for DA, we get the value of the parameter β' of the parabola of the after-body ; and substituting this value for *a* in equation (4), and giving to *y'* any value CK, a corresponding abscissa LK is obtained. And in the same manner as many may be found as may be thought proper. It is evident that GH and LK must be subtracted from the largest ordinate DC, to give G'H and K'L, which re­present the areas of the corresponding sections.

This method of first calculating the abscissas, and then subtracting them, may appear indirect, as the true lines G'H and K'L could have been obtained at once by trans­forming the equation of the parabolic line to another, be­ginning at the point D ; but it would then have lost its simplicity, and the calculations would not have been easier than by this method. One thing may, however, be donc, which is to substitute the area of the midship section in­stead of its quotient by the breadth, by which the whole areas of the other sections will be obtained, instead of the lines which represent them.

The principles of the parabolic method being now ex­plained, it will be easily seen how very useful its applica­tion is to the comparison of all ships, whether they were constructed with or without reference to it.

By referring to equation (1), we find that the displace­ment, area of midship section, and the construction water­line, being known, the exponent of a parabola that coincides most nearly with the line of sections is easily found ; and we shall have (putting M for the midship section) the value of

"≈ZM^^D

This value of *n* shows the degree of fulness of the ship.

The parabolic method may also be applied to show the relative fulness of the midship section, of any of the water­lines, of the displacement with respect to the water-line, and of several other elements.

Let ABC (fig. 23) represent a midship section, and let EF be a tangent to the curve at the point of contrary flex­ure C; the small area ECD not being of any importance, may be neglected. If the midship section is at all si­milar to those usually given to ships, a parabola may be assigned which shall pass through the points B and C, and have nearly the same area with the midship sec­tion, and also nearly coincide with the curve, so that the exponent will afford means of ascertaining its relative fulness.