If τ be the instantaneous axis of the element of fluid, whose velocity is σ, we have—

$$\triangleleft\sigma = -2\tau .$$

But

$$S\triangleleft^2\sigma = 0 ,$$

whence,

$$-\frac{1}{2}\triangleleft^2\sigma = V\triangleleft\tau ,$$

and

$$-\frac{1}{2}\sigma = \triangleleft^{-2}0 + \triangleleft^{-2}V\triangleleft\tau .$$

This contains the solution of the problem, treated by Helmholtz, to determine the linear velocity of each fluid particle, when the angular velocity is given.

4. Mathematical Notes. By Professor Tait.

The following self-evident propositions were employed for the deduction of several curious consequences—

(*a*.) $$4x = (x+1)^2 - (x-1)^2 ,$$

or, $$x^3 = \left(\frac{x(x+1)}{2}\right)^2 - \left(\frac{x(x-1)}{2}\right)^2 ,$$

or, "Every cube is the difference of two squares, one at least of which is divisible by 9."

(*b*.) If

$$x^3 + y^3 = z^3 ,$$

then

$$(x^3 + z^3)^3y^3 + (x^3 - y^3)^3z^3 = (z^3 + y^3)^3x^3 .$$

This furnishes an easy proof of the impossibility of finding two integers the sum of whose cubes is a cube.

Monday, 4th April 1870.

The Hon. Lord NEAVES, Vice-President, in the Chair.

At the request of the Council Professor Wyville Thomson, Belfast, delivered an address on "The Condition of the Depths of the Sea."