Second Meeting, December 10th, 1897.

J. B. CLARK, Esq., M.A., F.R.S.E., President, in the Chair.

On some questions in Arithmetic.

By Prof. STEGGALL.

Note on the Transformations of the Equations of Hydrodynamics.

By H. S. CARSLAW, M.A., Glasgow and Cambridge.

This summer there came into my hands a copy of the spring issue of the *Mittheilungen der Math. Gesellschaft in Hamburg* containing a paper on the "Transformationen der hydrodynamischen Gleichungen mit Berücksichtigung der Reibung."

On examination, I found embodied in the somewhat lengthy communication practically the following method, which I had entered in my notes three years ago when working at the subject. Thinking that it was bound to have been used earlier, I simply preserved it, as likely to prove useful if I were ever called upon to teach Hydrodynamics.

The fact of the aforesaid paper being afforded a prominent place in that German journal prompts me to submit this note to the Society. If the method is new, its publication in English seems not uncalled for.

§ 1.

The equations of motion in a viscous liquid, with regard to fixed rectangular axes, are accepted as

$$\frac{Du}{Dt} = X - \frac{1}{\rho}\frac{\partial p}{\partial x} + \nu\nabla^2 u,$$

and two others,

where $\frac{Df}{Dt}$ stands for $\left(\frac{\partial}{\partial t} + u\frac{\partial}{\partial x} + v\frac{\partial}{\partial y} + w\frac{\partial}{\partial z}\right)f$.

Now in this case $\nabla^2 u = 2\left\{\frac{\partial \eta}{\partial z} - \frac{\partial \zeta}{\partial y}\right\}$

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