

31, Coleridge St.  
Sloane Square, S.W.  
Sunday.

10/29  
 $\Phi$ ,

I'm completely stuck at a little point in Clark-Maxwell, Vol. II., p. 28. I cannot make out how the "Vector-Potential of Magnetic Induction" at a given point, due to a magnetised particle placed at the origin, is equal to the square of the radius vector  $\times$  sine of angle between radius vector and axis of magnetisation, & is  $\perp$  to plane of radius vector and axis of magnetisation.

Observe, the only def. of the Vector-potential is that given in the previous lines - viz., it is such that its line-integral over a closed curve = the Surface-integral of  $\bar{B}$ , the magnetic induction, and if its (~~scalars~~) components are  $F, G, H$ ,

$$a = \frac{\partial H}{\partial y} - \frac{\partial G}{\partial z}, \quad b = \dots, \quad c = \dots$$

How the dickens this def. enables us to find  $\bar{A}$  (the vector-potl.) for a magnetised particle, I don't see; and as I have no independent def. or

conception of  $\bar{A}$ , I can't find it out at all at all! Give me "more light" - not more blatherumskite, please.

Have you ever tried to get a lot of conjugate functions? By the aid of the theorem, so much used by Clark-Maxwell, that if  $u$  and  $v$  are conj. fns of  $\alpha$  and  $\beta$ , and  $\alpha + \beta$  conj. fns of  $x + y$ , then  $u$  and  $v$  are conj. fns of  $x$  and  $y$ , you can get a heap of such functions, thus getting a lot of equipotential curves and curves of flow. But the fatal objection which I find to lie against any that I have got is this - they all give me infinite densities at some points on the equipot. curves. The meaning of this I suppose to be that in such distrib<sup>ns</sup> there must be a continuous flow of elect<sup>q</sup> into the dielectric, and therefore such distrib<sup>ns</sup> have no electrostatic value. This obj<sup>n</sup> holds against some of the electrified plates (according to the values of their edge-angles) given in Clark-Maxwell. Here, for example, are two conj. fns  $u = a(x^2 - y^2) + 2hxy$ ,  $v = -h(x^2 - y^2) + 2axy$ , which you may combine with any of Clark-

Maxwells', but I don't think that you will succeed in getting distrib<sup>ns</sup> of continuously finite density.

It seems to me to be a matter worth looking into.

Grover has made an experimental cable of 100 thin copper wires, insulated with white lead, to begin rough work on.

He has also fixed a microscope at back of Electrometer, but he has not yet succeeded in suspending the disk by Wollaston platinum wires. These are so difficult to make without breaking, that he has failed twice with them. Clark succeeded (by Martini's process) in making a single silk fibre conduct admirably (by silvering). Perhaps we shall be obliged to resort to it. The difficulty, of course, lies in its attachment to the disk.

M.

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