Tangents to a conic (or to confocal conics) at right angles meet on a circle.

By Professor JACK.

Fourth Meeting, 8th February 1901.

J. W. BUTTERS, Esq., M.A., B.Sc., President, in the Chair.

Note on the Cooling of a Sphere in a mass of well-stirred Liquid.

By Dr W. PEDDIE.

If the original distribution of temperature be symmetrical about the centre, the equation of conduction has the well-known form

$$\frac{\partial^2 u}{\partial r^2} = \frac{c\rho}{k}\frac{\partial u}{\partial t}, \qquad - \quad - \quad - \quad - \quad - \quad (1)$$

with the condition $\qquad u = vr, \qquad - \quad - \quad - \quad - \quad - \quad - \quad (2)$

v being the temperature; and the initial condition gives

$$u = rf(r),\ t = 0. \qquad - \quad - \quad - \quad - \quad - \quad (3)$$

If we assume that the rate of loss of heat from the liquid is very small, the condition that the gain of heat by the liquid is equal to the loss of heat by the sphere gives

$$-4\pi a^2 k\left(\frac{\partial v}{\partial r}\right)_{r=a} = M\sigma\left(\frac{\partial v}{\partial t}\right)_{r=a}, \qquad - \quad - \quad - \quad (4)$$

where a is the radius of the sphere, M is the mass of the liquid, and σ is its specific heat.

By the usual process we find that the solution

$$u = A_0 r + \Sigma A_m \sin\alpha_m r \, . \, e^{-\frac{k}{c\rho}\alpha^2_m t} \qquad - \quad - \quad - \quad (5)$$

suits (1) and (2); and (4) then gives

$$(1 + pa^2\alpha^2_m)\tan\alpha_m a = \alpha_m a, \qquad - \quad - \quad - \quad (6)$$

where $p = M\sigma/4\pi a^3 c\rho$.

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