We must refer this to axes of x, y which are independent of the position of P if we wish to use equations (3). We then have

$$F = -A\eta/p, \qquad G = A\xi/p, \qquad H = 0,$$

where $(\xi, \eta, 0)$ are the coordinates of P and $p^2 = \xi^2 + \eta^2$.

For an elementary lamellar shell, the vector potential is $A = M \sin\theta/r^2$, where $r = OP$, θ is the angle r makes with the axis Oz and $M = \pi a^2 m$. The direction of the vector is perpendicular to the plane POz and its positive direction is clockwise round Oz.

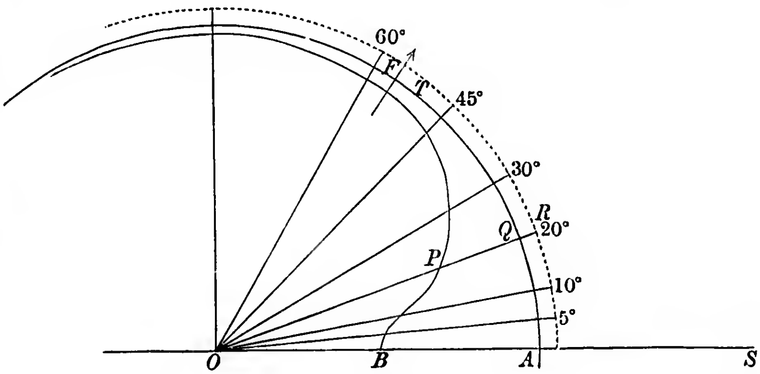
For an elementary magnet whose moment is M, centre O, and axis the axis of z, we assume the magnitude of the vector to be $M \sin\theta/r^2$ and its direction to be as just described. The components are then evidently $F = -\dfrac{M\eta}{r^3}$, $G = \dfrac{M\xi}{r^3}$, $H = 0$. Since the potential of an elementary magnet is $M \cos\theta/r^2$, it is not difficult to see that the equations (3) are satisfied.

To find the components of the vector potential of a small magnet when the direction cosines of the axis are λ, μ, ν, we resolve the magnet into $M\lambda$, $M\mu$, $M\nu$. The F component of $M\lambda$ is zero, those of $M\mu$, $M\nu$ are $M\mu\zeta/R^3$ and $-M\nu\eta/R^3$ respectively. The F component for a magnetic body at P is therefore

$$F' = \iiint I \,\frac{\mu\zeta - \nu\eta}{R^3}\, dx\, dy\, dz,$$

where R is the distance of any point (xyz) of the body from the point P in space whose coordinates are (ξ, η, ζ) and $M = I dv$, Art. 326.

NOTE N, Art. 397. **Electrified sphere.** The figure has been drawn by Dickson to show the distribution of electrical density on the surface of a sphere under the influence of a point-charge at S (where $OS = 10$, $OA = 6$). Let a radius vector from the centre O cut the curve drawn inside the circle in P, the circle itself in Q, and



the dotted circle outside in R. The length PQ then represents the density of the (negative) charge at any point Q of the sphere, when uninsulated; while the length QR would represent the uniform density of an equal (positive) charge freely distributed on the sphere, when the point-charge at S is absent and the sphere insulated. Consequently, if the sphere be initially uncharged and at zero potential,