ON THE UNSYMMETRICAL TOP.

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1. The problem of the top has an extensive literature but it is a literature of special cases, the specialization arising either in (a) the initial conditions, (b) the form of the momental ellipsoid, (c) the position of the centroid, or (d) a combination of the three. To this can be added a number of articles whose aim is to show that for general initial conditions there can not be an additional algebraic relation among the components of the angular velocity, excepting in the special cases that have been solved. References to the older papers are given by Stäckel[1] and by Klein and Sommerfeld[2]; references to a number of more recent papers are given by Whittaker.[3] This paper gives a solution of a special case which is so simple that it seems worthy of notice. The solution is of the type considered by N. Kowalewski.[4]

2. Let I_1, I_2, and I_3 be the principal moments of inertia of the body for the lines OX_1, OY_1, OZ_1, which are fixed in the body, let (o, o, h) be the coordinates of the centroid referred to the body axes, let θ, φ, ψ be Euler's angles, and let X, Y, Z be axes fixed in space. The point O is the fixed point, gravity is the only extraneous force, and the mass is m. For convenience mg will be represented by w in the equations of motion. If we call $\omega_1, \omega_2, \omega_3$ the components of the angular velocity along the body axes, Euler's equations are

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[1] Encyklopädie der Mathematischen Wissenschaften, Bd. 4, S. 581.

[2] Theorie des Kreisels.

[3] Analytical Dynamics, third Ed. p. 166.

[4] Mathematische Annalen, Bd. 65.