1) 96(8): Charge and Current Densities for the Generalized Incompressible Sphere of Fluid: Internal Fields

The fundamental equation being solved here is:

$$d \wedge \tilde{F} = A^{(0)} \left(\tilde{R} \wedge q \right)_{grav} \quad -(1)$$

in the GCUFT notation. The incompressible sphere could for example be an electron. Therefore the curvature $\tilde{R}$ produces an electromagnetic field $\tilde{F}$ given $A^{(0)}$, which comes from the fundamental constant e. The generalized Crothers solution was used in the Maxima program by Dr. Horst Eckardt to give the following results, using Crothers' notation on page 4 of his section of paper 93. We have $R \wedge q = 0$.

Coulomb Law

$$\underline{\nabla} \cdot \underline{E} = \phi \left(\frac{4 \cos(|X - X_0|) \kappa \rho_0}{\left(\cos(|X - X_0|) - 3\cos(|X_a - X_0|) \right)^3} \right) \quad -(2)$$

Radial Current Component

$$J_r = \frac{A^{(0)}}{\mu_0} \left(\frac{\cos(|X - X_0|) \kappa^2 \rho_0^2}{9 \left(\cos(|X - X_0|) - 3\cos(|X_a - X_0|) \right)} + \frac{2\kappa^2 \rho_0^2}{9} \right) \quad -(3)$$

Angular Current Components

$$J_\theta = J_\phi \sin^2\theta = \frac{A^{(0)}}{\mu_0} \left(\frac{\cos(|X - X_0|) \kappa^2 \rho_0^2}{9 \left(\cos(|X - X_0|) - 3\cos(|X_a - X_0|) \right)} \right.$$

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$$+\frac{\kappa^2\rho_0^2}{9\sin(|x-x_0|)^2}-\frac{\left(\cos(|x-x_0|)-1\right)\left(\cos(|x-x_0|)+1\right)\kappa^2\rho_0^2}{9\sin(|x-x_0|)^4} \quad -(4)$$

Here:

$$\underline{\nabla}\times\underline{B}-\frac{1}{c^2}\frac{\partial \underline{E}}{\partial t}=\mu_0\underline{J} \quad -(5)$$

where

$$\underline{J}=J_r\,\underline{e}_r+J_\theta\,\underline{e}_\theta+J_\phi\,\underline{e}_\phi \quad -(6)$$

in spherical polar coordinates.

These are the results for the interior of the incompressible sphere of fluid. They reduce to the original Schwarzschild results of 1916 in a well defined special case. Crothers has shown that there is a well defined lower and upper bound for the radius of the sphere. So if the classical electron is modelled in this way it has a lower bound on its radius and internal electric and magnetic fields. Usually in the Maxwell Heaviside theory the electron is a point source. These results also agree with the fact that in ECE, every particle has a minimum volume.