Chapter 8 Experimental Tests

Every new theory should possess some feature that can be checked experimentally, for the objective in the creation of a new physical theory should be a better understanding of physical phenomena. The following suggested experiments represent but a few possible tests of the five-dimensionality of the Dynamic Theory, for each depends upon the five-dimensional fields.

8.1 Speed-of-Light Measurements

The various speeds associated with the five-dimensional plane wave have been studied in detail.[17] Here, for simplicity, we will limit our discussion to phase velocity, defined as that velocity at which the wave phase remains constant. The trial solution used in the wave equation was

$$\exp[-i(\omega t - kx - K_4\gamma)]; \qquad (8.1)$$

therefore, the wave phase

$$\phi = \omega t - kx - k_4\gamma . \qquad (8.2)$$

If we set

$$\frac{d\omega}{dt} = 0,$$

we find

$$v_p = \frac{\omega}{k} - \frac{d(k_4\gamma)}{kdt}$$

Substituting for k_4 from Chapter 6, the phase velocity becomes

$$v_p = \frac{\omega}{k} - \frac{C_3}{a_0 c\gamma^2 k}\dot{\gamma}, \qquad (8.3)$$

where it is assumed that k and k_4 are independent of time.

Now if mass is conserved, then

$$\dot{\gamma} = -\gamma u^j,j \quad , (8.4)$$

where the u^j are the components of the medium flow where v_p is defined. By substituting Eqn. (8.4) into Eqn. (8.5), the phase velocity becomes

$$v_p = \left(\frac{\omega}{k}\right) + \left(\frac{C_3}{a_0 c\gamma k}\right)u^j,j. \qquad (8.5)$$

In classical electromagnetism any uniform motion of the medium is not reflected in the speed-of-light measurements. The same thing is true of the phase velocity given by Eqn. (8.5). On the other hand, a divergence in the flow of the medium will affect the phase velocity. The velocity change, owing to a divergence in the flow, is inversely proportional to the density of the medium. Because of the change also is proportional to parameter C_3, which has not yet been completely determined by the wave solution, it cannot be seen yet whether any envisioned experiment could measure the predicted change in velocity. To do so would require completing the wave solution to determine C_3.

One suggested experiment might be measuring the phase velocity in the divergent flow coming out of a nozzle in a hypervelocity wind tunnel. Although such an experiment might not be sensitive enough to detect the predicted velocity change particularly, μ and would change because of the change in mass density.

Another possibility, which was suggested by Bobby G. Craig, is to measure the travel time of a strong beam of gamma rays through a divergent flow of gas created by explosives. This may create the largest divergent flow possible, but whether or not other experimental difficulties could be surmounted to make reliable measurements is unknown.

8.2 Index of Refraction

The change in the parameters μ and was mentioned in the speed-of-light experiment discussion. From the plane wave solutions, we found that

$$\varepsilon = \varepsilon_0^{\varepsilon} \frac{i}{a_0 c}(C_1 - C_3)\gamma$$

and

$$\mu = \frac{\mu_0}{\left[1 + \frac{\mu_0 \omega^2}{C_2 C_3}(\varepsilon - \varepsilon_0)\right]}$$

Classically, the index of refraction for dielectrics is given by $(\mu)^{1/2}$. However, given the wave solution, we must consider the boundary conditions as the wave passes through a boundary between two media, determine the energy transmission and reflection coefficients, and then find the index of refraction from a modification of Snell's law. That is, the index of refraction should indicate the angle of the refracted wave with respect to the incident wave.

A cursory look at a five-dimensional wave incidence upon a boundary produces the relation

$$\frac{\sin\theta_0}{\sin\theta_2} = \frac{k_2}{k_0} + \frac{(\gamma_0 k_{40} - \gamma_2 k_{42})}{k_0 \sin\theta_2}. \qquad (8.6)$$

But from Chapter 6 we find

$$k = \left[1 - \left(\frac{C_3}{C_2 \omega}\right)(C_1 - C_2)\right]^{\frac{1}{2}} \sqrt{\mu\varepsilon}\left(\frac{\omega}{c}\right),$$

if $y=0$. Also,

$$k_4 \gamma = C_4 + \frac{C_3 \gamma}{a_0 c}.$$

Then we have

$$\frac{\sin\theta_0}{\sin\theta_2} = \frac{\beta_2}{\beta_0} + \frac{[(a_0 c(C_{40} - C_{42}) + (C_{30}\gamma_0 - C_{32}\gamma_2)]}{\beta_0 a_0 \omega \sin\theta_2}, \quad (8.7)$$

where

$$\beta = \sqrt{\mu\varepsilon}\sqrt{1 - \frac{C_3}{C_2 \omega}(C_1 - C_3)}.$$

Then, if the frequency is high enough,

$$\frac{\beta_2}{\beta_0} >> \frac{[a_0 c(C_{40} - C_{42}) + (C_{30}\gamma_0 - C_{32}\gamma_2)]}{\beta_0 a_0 \omega \sin\theta_2}$$

We would be tempted to define as the index of refraction. On the other hand, the classical notion of the index of refraction involves the ratio of the sin of the incident and refracted waves. In Eqn. (8.7), the appearance of sin 2 in the right-hand side makes matters more difficult. However, C_{45} is a phase angel we may set at zero, and we may choose the reference medium, *0*, to be free space for which *0 = 0*; then Eqn. (8.7) can be written as

$$\frac{\sin\theta_0}{\sin\theta_2} = \frac{\beta_2 + \left[\frac{1}{a_0 \omega \sin\theta_2}\right][C_{32}\gamma_2 + a_0 c C_{42}]}{\beta_0}.$$

Then we may define

$$\eta = \beta - \frac{(C_3\gamma + a_0 c C_4)}{a_0 \omega \sin\theta}, \qquad (8.8)$$

so that Eqn. (8.7) becomes

$$\frac{\sin\theta_0}{\sin\theta_2} = \frac{\eta_2}{\eta_0},$$

so long as the reference medium is free space. If we call the index of refraction, we find that

$$\eta = \sqrt{\mu\varepsilon}\sqrt{1 - \left(\frac{C_3}{C_2\omega}\right)(C_1 - C_3)} - \frac{(C_3\gamma + a_0 c C_4)}{a_0 \omega \sin\theta},$$

depends upon both the frequency and the mass density.

A possible experimental test may be obtained by applying rigorous boundary conditions to the five-dimensional wave incident upon a boundary. This would verify or correct the modified Snell's law given by Eqn. (8.7). The frequency dependence of the refracted wave angle that was determined experimentally may be compared with the predicted angle. Another comparison may be done by considering the density dependence of the refracted wave.

8.3 Neutron Interferometer

A neutron interferometer can detect extremely small differences in forces upon each of two neutron beans by using interference techniques. It can detect the difference in the earth's gravitational field that is due to a height change of only 2 cm near sea level with some thirty fringe shifts.

If the long-range character of the V field, as seen from the radial dependence required for a fundamental particle,

$$V_r - \frac{Wg}{r^2}\left(1 - \frac{\lambda}{r}\right)e^{-\left(\frac{\lambda}{r}\right)}$$

requires that the V field is to be interpreted as the gravitational field, then the force law,

$$\overline{K} = \rho\overline{E} + \frac{J_4}{c}\overline{V},$$

would require that J_4/c be interpreted as the gravitational mass density. This would require

$$m_g = \int_v \frac{J_4}{c} dV$$

to be the gravitational mass of a particle contained within the volume *V*. The gravitational force on a particle in a gravitational, or *V*, field would be given by

$$\overline{F} = m_g \overline{V}.$$

This implies that the transverse V field accompanying the and B component in the electromagnetic wave would apply a force on a neutron through an interaction with its gravitational mass. Therefore, a beam of neutrons passing through a polarized layer beam should be slightly deflected owing to the gravitational field component. This effect would be most easily detected if, through the use of some appropriate mirror, a standing optical wave could be created using a polarized laser beam. Then a neutron beam passing through an appropriate part of the gravitational component of this standing wave would have all the neutrons deflected in the same direction.

The sensitivity of the neutron interferometer may be such that, if one neutron beam passes through a standing optical wave created by a laser of appropriate frequency, very minuscule deflections could be detected. The appropriate laser frequency should be chosen to maximize the predicted deflection. This, of course, requires that the wave solution be completed so that the relative strength of the transverse gravitational component is known; that is, because

$$V_y = \left(\frac{-C_3}{\omega} \right) E_y,$$

we must know C_3 before we can choose the best laser frequency and power.

If a deflection is detected and has the predicted dependence upon laser frequency and power, then the electromagnetic wave must be accompanied by a gravitational component.

8.4 Nuclear Mass

We infer from the neo-coulombic electrostatic force that the nucleus may be made up of complex orbits of electrons and protons, plus possibly positrons, as discussed in Chapter 4. The transcendental nature of the forces involved requires the use of a computer in solving the equations of motion. Computer solutions may be obtained and the masses predicted; then these predicted masses may be compared with the existing experimental masses. A good comparison between the predicted and experimental masses, accounting for possible errors introduced by any assumptions made to obtain a solution, would increase the theory believability.

8.5 Gravitational Rotor

The continuity equation in the Dynamic Theory is

$$0 = \frac{\partial \rho}{\partial t} + \overline{\nabla} \cdot \overline{J} + a_0 \frac{J_4}{\partial \gamma}$$

If we consider only steady state conditions such that

$$\frac{\partial \rho}{\partial t} = 0$$

then we have

$$a_0 \frac{\partial J_4}{\partial \gamma} = -\overline{\nabla} \cdot \overline{J}. \qquad (8.9)$$

Equation (8.9) states that if one can create a non-zero divergence in the current density then one creates a particular variation between the gravitational mass density and the inertial mass density. This is in violation of both the classical conservation of charge and Einstein's assumed equivalence principle.

Suppose we consider what happens when we pass a current into the apex of a cone, as shown in Figure (16).

FIGURE 1: Current into the apex of a cone

Any position on the exterior of the cone is given by

$$y = d + fx$$

where the height of the cone is

$$h = \frac{d}{f},$$

therefore $f = d/h$.

If a steady current, I, is flowing into the apex of the cone, then at any x the current density is given by

$$\overline{J} = \left(\frac{1}{area}\right)\cos\theta\hat{x} + \theta\hat{y}.$$

But the area is given by

$$Area = \pi(2y)t,$$

while the

$$\cos\theta = \frac{h}{\sqrt{d^2 + h^2}}$$

thus our current density vector becomes

$$J = \left[\left(\frac{I}{2\pi yt}\right)\frac{h}{\sqrt{d^2 + h^2}}\right]\hat{x} + o\hat{y}. \qquad (8.10)$$

Now we may form the divergence of this current density, noting that the above assumes that the current density is a constant throughout the thickness t.

$$\overline{\nabla}\cdot\overline{J}=\frac{\partial Jx}{\partial x}+\frac{\partial Jy}{\partial y}=\frac{\partial Jx}{\partial x}$$

$$=\frac{\partial}{\partial x}\left\{\frac{I\cos\theta}{2\pi t[d+(d/h)x}\right\}$$

$$=\left(\frac{hI\cos\theta}{2\pi td}\right)\frac{\partial}{\partial x}\left[\frac{1}{(h+x)}\right] \qquad (8.11)$$

$$=\left(\frac{-Ih\cos\theta}{2\pi dt}\right)\frac{1}{(h+x)^2}$$

Substituting the result, Eqn. (8.11), into equation (8.9), we have

$$a_0\frac{\partial J_4}{\partial\gamma}=\frac{Ih\cos\theta}{2\pi dt(h+x)^2} \qquad (8.12)$$

This is a differential equation whose solution is

$$J_4=\frac{Ih\cos\theta\gamma}{2\pi a_0 dt(h+x)^2}+J_0 \qquad (8.13)$$

Thus, the gravitational charge density is given by

$$\frac{J_4}{c}=\frac{Ih\gamma\cos\theta}{2\pi a_0 cdt(h+x)^2}+\frac{J_{40}}{c}, \quad (8.14)$$

Suppose we now consider two cones joined at their bases as shown in Figure (17).

FIGURE

The element of torque about the point *A* experienced due to the presence of the earth's gravitational field *V* is found from the relation, *torque = force x distance*. Therefore,

$$d\tau=-2\left[\frac{Ih\gamma\cos\theta}{2\pi a_0 cdt(h+x)^2}\right](\pi ty)Vxdx-\frac{2J_{40}}{c}(\pi tyVx) \quad (8.15)$$

The effect of the constant of integration term with J_{40} is to predict a constant torque without current flow. Since this should have been noticed we shall take $J_{40}=0$. Thus

$$d\tau=\left[\frac{-Ih\gamma d(1+x/h)V}{a_0 cd(h+x)^2}\right]xdx\cos\theta$$

$$d\tau=\left[\frac{-I\gamma vx}{a_0 c(h+x)}\right]dx\cos\theta \qquad (8.16)$$

We obtain the total torque by integrating from x given by

$$D=d+\frac{dx}{h}$$

or

$$x_0=h(D/d-1)$$

to

$$x=0.$$

Thus, we have

$$torque = \int d\tau = \int_{x=h(D/d-1)}^{0} \left[\frac{-I\gamma v}{a_0 c}\right]\frac{xdx}{(h+x)}.$$

Then the torque is determined by

$$torque = \left(\frac{-I\gamma v}{a_0 c}\right)\left\{x - h\ln(h+x)\,|_{x=h(D-d)}^{x=0}\right\}\cos\theta$$

$$= \left(\frac{-I\gamma v}{a_0 c}\right)\left\{-h\ln(h) - \frac{h}{d}(D-d) + h\ln[h + h(D/d-1)]\right\}\cos\theta$$

$$= \left(\frac{-I\gamma v}{a_0 c}\right)\left\{\frac{h}{d}(d-D) + h\ln[D/d]\right\}\cos\theta$$

or

$$torque = \left(\frac{-I\gamma vh}{a_0 c}\right)[(1-D/d) + \ln(D/d)]\cos\theta \qquad (8.17)$$

Suppose we pick some parameters; such as *I = 10 amps, h = d = 0.1 m, D = 0.01 m.*
With these parameters

$$\left(\frac{h\cos\theta}{c}\right)[(1-D/d)+\ln(D/d)] = \frac{(0.1)^2\left[\frac{1-0.01}{.1} + \ln\frac{(0.01)}{0.1}\right]m}{3\times10^8\,(m/\sec)\sqrt{(0.1)^2 + (0.1)^2}}$$

$$= -3.3059\times10^{-10}\sec^{-1}.$$

Thus, we have

$$torque = +\left(\frac{\gamma v}{a_0}\right)(3.3059\times10^{-9}\sec^{-1})\ amps.$$

We now need to choose a material to obtain the mass density, determine the gravitational field *V*, and obtain a value for a_0. Let's do them in the reverse order. Shock wave physics investigations produced an extremely rough estimate of a_0 which was

$$a_0 \sim 4\times10^7\,kg/m^4.$$

The earth's gravitational field strength, at sea level, is given by

$$v = -9.8\left(\frac{volt-coul}{m-kg}\right)\frac{1}{\beta}$$

$$= -\frac{9.8\left(\frac{volt-coul}{m-kg}\right)}{2.4296\times10^{11}(coul/kg)}$$

$$= -4.0336\times10^{11}\,volt/m.$$

If we choose aluminum as our material, then = *2.7 x 10*^{3} *kg/m*^{3} and our torque becomes

$$torque = \frac{(2.7\times10^{3}\ kg/m^{3})(-4.0336\times10^{11}\ volt/m)}{(4\times10^{7}\ kg/m^{4})}(3.3059\times10^{-9}\ coul)$$

$$= -9.0\times10^{2}\ volt-coul$$

$$= -9.0\times10^{-2}\ nt-m\left(\frac{0.73757\,ft.-lb}{nt-m}\right)$$

so that

$$torque = 6.638\times10^{-2}\ ft.-lb.$$

This is not a very large torque, however, different cone parameters could be chosen to optimize the torque.

There is another aspect which I don't yet know how to approach. In electric motors there is a phenomena known as armature reaction which tends to limit armature current far more than the armature resistance does. I suspect there is a

Figure 2. Upright cone, powered from within.

somewhat analogous reaction here that may further reduce the torque but it would take time to investigate this possibility.

One final point on the creation of a gravitational field. A long held desire of mankind is to be able to exert some control over the grip the earth's gravitational field has over him. A slight variation of the above torque device might allow the generation of this control.

Suppose we look at a single cone set upright as shown in Figure (18). From the equations generated before for the torque we see that the lift force generated by this simple device would be given by integrating the element of force

$$dF = \frac{-I\gamma V\cos\theta}{a_0 c(h+x)}dx$$

or

$$Force = \left(\frac{-I\gamma v\cos\theta}{a_0 c}\right)\{\ln(h+x)\,|_{x=h(D/d-1)}^{0}$$

$$= \frac{+I\gamma v\cos\theta}{a_0 c}\{\ln[1+D/d-1]\}$$

$$= \left(\frac{-I\gamma v\cos\theta}{a_0 c}\right)\ln(d/D)$$

Thus, since $V = 4.0336\ x\ 10^{11}\ volt/m$, the force becomes

$$Force = \frac{I\gamma\ \ln(d/D)h}{a_0 c\sqrt{d^2+h^2}}(4.0336\times10^{11}\,volt/m)$$

Obviously, other physical shapes may achieve similar results; perhaps with an even greater levitation force than the simple cone.

8.6 Nuclear Lamb Shifts

The atomic Lamb shift experiments were some of the best experiments in science because of the comparison between predictions and experimental data. We now should have the capability of doing gamma ray spectroscopy. Then preditions of the nuclear energy levels as given by the nuclear model and potential given in Chapter 4 may be checked experimentally.