Solutions of the Photon Decay Equation for the decay rate, action h, and the speed of light c all exist and are easy to obtain. These solutions are important for they show the understanding is internally consistent and part of a closed mathematical system. It is valuable to be certain of that when attempting to describe a phenomenon which may have no upper limit on distance and time. Thus the near-infinities involved still remain within the reasoning of Russell, and the Photon Decay equation's mathematical basis does not go beyond the limits suggested by Godel. These definitions of the constants c and h are practical and common-sensical; they can be comprehended within a finite scope in real numbers and permit discussion with a finite, even though large, range. From the original equation

$$\nabla^2\phi = \frac{1}{c^2}\left[\frac{1}{h}\frac{\partial\phi}{\partial t} + \frac{\partial^2\phi}{\partial t^2}\right] \qquad \text{Equation 1}$$

$$c^2\nabla^2\phi = \frac{1}{h}\frac{\partial\phi}{\partial t} + \frac{\partial^2\phi}{\partial t^2} \qquad \text{Equation 2}$$

$$\frac{1}{h}\frac{\partial\phi}{\partial t} = c^2\nabla^2\phi - \frac{\partial^2\phi}{\partial t^2} \qquad \text{Equation 3}$$

Figure 1

$$\frac{\partial\phi}{\partial t} = h\left[c^2\nabla^2\phi - \frac{\partial^2\phi}{\partial t^2}\right] \qquad \text{Equation 4}$$

which is the decay rate.

The solution for h is easy; it is

$$h = \frac{\frac{\partial\phi}{\partial t}}{c^2\nabla^2\phi - \frac{\partial^2\phi}{\partial t^2}} \qquad \text{Equation 5}$$

The solution for c is a little more complicated. The solution for c^2 is

$$c^2 = \frac{\frac{1}{h}\frac{\partial\phi}{\partial t} + \frac{\partial^2\phi}{\partial t^2}}{\nabla^2\phi} \qquad \text{Equation 6}$$

$$c = \sqrt{\frac{\frac{1}{h}\frac{\partial\phi}{\partial t} + \frac{\partial^2\phi}{\partial t^2}}{\nabla^2\phi}} \qquad \text{Equation 7}$$

With the photon decay equation thus self-consistent, it becomes more likely a viable candidate for the simplest possible explanation for the observed Hubble Red Shift found in the spectral plates of distant exterior galaxies.

Another fact that emerges is that it is not possible to determine, from a single stream of photons at some particular, observed frequency, whether the frequency and wavelength are from a very much shorter wave that began very far away, or a photon of only slightly shorter wavelength that began much closer. Neither the decay rate nor the absolute frequency (wavelength, etc) depend on any kind of integral over the path from the source to the observation. In practice, the Red Shift interpretation as distance makes sense, though only when an entire spectrum is found, so that many different terms, recognizable in the spectral envelope, are found to have been shifted the same amount.