

## SECTION 10

### *The Common Cause – The Universal Exponential Decay*

#### A GENERAL ANOMALOUS ACCELERATION THROUGHOUT THE UNIVERSE

We have now found that there are small, centrally directed, distance independent, non-gravitational, same, anomalous accelerations appearing as a near Earth effect [the Flybys Anomaly], a Solar effect [the Pioneer Anomaly], a galactic effect [galactic rotation curves], and a Universe effect [the Dark Flow]. It can only be concluded that the same effect must appear relative to every planet [and every planet's moons], every sun [star], every galaxy and group of galaxies, and the universe overall. In other words as a general cosmic effect.

What could produce such a phenomenon? What would cause there to be a Universe-wide occurrence of such same inward accelerations?

Taken together, planet relative, star relative, galaxy relative, Universe relative, they collectively are a systematic contraction, a gradual reduction in the length component of every physical quantity in the universe. A general universal decay, a universal contracting which is the result of the *Propagated Outward Flow* gradually depleting the original supply of *medium* in the *core* of each particle of the Universe per Section 3.

In material reality such decays are exponential. There are myriad examples of such, for example: radioactive decay, the decay of electrical transients in circuits involving inductance, capacitance and resistance, the decay of motion transients in mechanical systems involving mass, spring and damping, the amplitude decay in a rung bell or a plucked string, etc. It is not unreasonable that a universe that began with an explosive “bang” follow that with a gradual exponential decay.

The Universal Exponential Decay is an exponential decay of the length dimensional aspect of all quantities in the universe. It involves the fundamental constants ( $c$ ,  $q$ ,  $G$ ,  $h$ , etc.) and decay of any of those must be dimensionally consistent with the decay of the others. The dimension that is decaying is length, the  $[L]$  dimension in the

dimensions of, for example: the Planck constant,  $h$ ,  $[M \cdot L^2/T]$ ; the speed of light,  $c$ ,  $[L/T]$ ; and the gravitational constant,  $G$ ,  $[L^3/M \cdot T^2]$ . The time constant of the decay is about  $\tau = 3.57532 \cdot 10^{17}$  sec ( $\approx 11.3373 \cdot 10^9$  years) per Section 3.

Objections that such an effect would conflict with the solar system's known planetary system performance per the highly accurate planetary ephemeris are a mistaken interpretation of the situation. Consider a planet in circular orbit around a sun as in Figure 10-1, below.

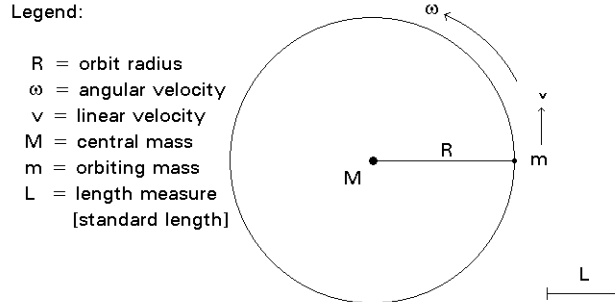


Figure 10-1

The relationship governing the motion is, of course, equation (10-1), below.

$$(10-1) \quad \begin{array}{ccc} \text{Centripetal Acceleration} & = & \text{Gravitational Attraction} \\ \text{Required} & & \text{Acceleration} \\ V^2/R \text{ (or) } R \cdot \omega^2 & = & G \cdot M/R^2 \end{array}$$

Now, let the length dimensional aspect of all quantities decay, becoming gradually smaller with time [with the dimensions of all quantities expressed in the fundamental dimensions of mechanics,  $[L]$ ,  $[M]$ , and  $[T]$ ]. That is, let all lengths,  $[L]$ , decrease by being multiplied by the decay function,  $D(t)$ , per equation (10-2), below. [For the present purpose the form of the decay function is irrelevant except that it must be a function of time. The decaying exponential is used because it is common in nature and is a complicated case.]

$$(10-2) \quad D(t) \equiv e^{-[t/\tau]}, \text{ where } \tau \text{ is the time constant of the decay}$$

Then the quantities involved in equation (10-1) all change to as follows.

$$(10-3) \quad \text{The Orbital Radius, } R, \text{ [dimension} = L]$$

$$R \text{ becomes } R(t) = R(t=0) \cdot D(t)$$

$$\text{The Gravitational Constant [dimensions} = L^3/M \cdot T^2]$$

$$G \text{ becomes } G(t) = G(t=0) \cdot [D(t)]^3$$

$$\text{The Centripetal Acceleration Required [dimensions} = L/T^2]$$

$$R \cdot \omega^2 \text{ becomes } R(t) \cdot \omega^2 = [R(t=0) \cdot \omega^2] \cdot D(t)$$

etc. The overall net effect is:  $R$  decays, the required centripetal acceleration decays in proportion, the gravitational attraction likewise decays in proportion, and  $\omega$  is

unchanged. Because the time constant and the start of all of the decays are identical and arise from the same Big Bang beginning, the physical laws inter-relationships remain unchanged and coordinated with each other.

Furthermore, we observers, using our measuring standard ruler, length  $L$  of the above Figure 10-1, would never detect any of the decay because our standard length would also be decaying at exactly the same rate, in the same proportion.

The point of this obvious mathematics / physics exercise is that a universal decay of the length aspect of all material reality would not conflict with the planetary ephemeris and would not even be detectable at all except in unusual circumstances such as the Pioneer and Flyby anomalies and the evidence of galactic rotation curves; nor would it interfere with the relative values of the fundamental constants and their interactions in physical laws.

Returning to the orbiting body of Figure 10-1, reproduced as Figure 10-2, below, the figure's annotations slightly modified, the development of the anomalous acceleration is very direct.

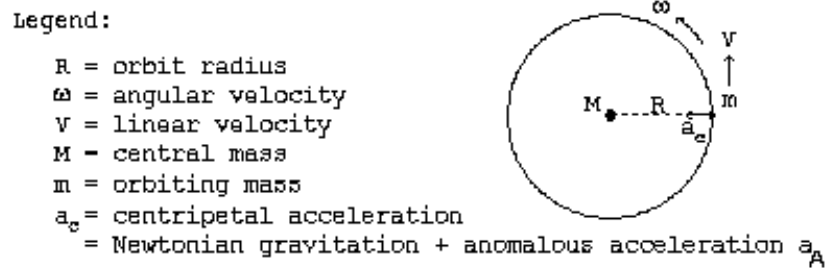


Figure 10-2

The Newtonian gravitation component of the centripetal acceleration,  $a_c$ , is only sufficient to maintain the orbit, to keep  $R$  constant, to prevent its increasing. For the orbiting body,  $m$ , to gradually approach the central mass,  $M$ , that is for  $R$  to decrease, additional inward acceleration is required.

That inward acceleration is the anomalous acceleration appearing as a near Earth effect [the Flybys Anomaly], a Solar effect [the Pioneer Anomaly], and a galactic effect [galactic rotation curves]. It is an unavoidable concomitant effect of the contraction of the length dimension  $[L]$  of  $R$  in the above example and of the systematic contraction, the gradual reduction in the length component, of every physical quantity in the Universe, of all material reality by the Universal exponential decay.

Then, what is the magnitude of that anomalous acceleration ?

Next: Calculating The Anomalous Acceleration from  
The Universal Exponential Decay's Decay Constant