

SECTION 6

The Mechanics of Gravitation – What It Is; How It Operates

Having contended that the theory of gravitation set forth in Einstein's "General Theory of Relativity" is wrong and unacceptable because there is no supporting mechanism by which its contended "curving of space" can occur or be caused, it is incumbent upon the present author to provide an alternative theory.

That is the function of this Section 6.

The behavior of gravitation is well known, described by Newton's Law of Gravitation. But what gravitational mass is, how gravitational behavior comes about, what in material reality produces the effects of gravitation, is little understood. The extant hypotheses include Einstein's General Relativity's bending of space, efforts to develop "quantum gravitation", and attempts to detect "gravitons". None of those addresses the cause, the mechanism of gravitation.

Experience shows that everything has a cause and that those causes are themselves the results of precedent causes, and *ad infinitum*. Defining and comprehending the causality or mechanism operating to produce any observed behavior is essential to understanding or explaining the behavior.

From a start of only the limitation on the speed of light, the necessity of conservation, and the impossibility of an infinity in material reality, the present paper presents a comprehensive development of the mechanics, the operation of gravitation

The Einstein model of gravitation is that of his General Theory of Relativity. That theory describes the behavior of gravitation and the effects that it produces. But, it does not address the cause, the mechanism, of that behavior and effects. The closest that General Relativity comes to the cause or mechanism of gravitation is the contending that gravitational mass "curves" or distorts "space", the distortion leading to the various effects of gravitation. However, no cause or mechanism for the contended distortion of space is offered nor is an explanation of what that "space" or space-time is and how it is subject to being curved or distorted.

The comprehensive explanation of the cause and mechanism of gravitation as derived from the origin of the universe, the Modern Newtonian Model of Gravitation, is not a replacement for, nor contradiction of, the useful aspects of General Relativity but a supplementing of it with an alternative model which unlike General Relativity leads to resolution of the problem of “Big G” and to partial control of gravitation and applications of it.

The development of the Modern Newtonian Model of Gravitation consists of the following steps. Each step results in new “hard” facts generated directly from prior “hard” facts. The development does not contain nor rely on opinions. Consequently, while it is deemed a “model” it is an exact factual description of what it treats.

- 1 – How the universe’s particles of matter came into existence.
- 2 – How they came to be propagating an outward flow.
- 3 – The reservoir supply for the substance of the outward flow.
- 4 – The speed of the outward flow.
- 5 – A particle’s flow encountering another particle slows its outward flow.
- 6 – The outward flow has momentum.
- 7 – Gravitation is the momentum reaction to outward flow slowing.

The origin of matter, its outward flow, and its reservoir for the substance flowing outward have all been presented in the preceding Sections 1, 2, and 3.

THE SPEED OF THE OUTWARD FLOW

Every oscillation that we know in nature exhibits, and the very theory of oscillations in the abstract requires, that the oscillation consist of two aspects storing and exchanging the energy of the oscillation back and forth by means of a "flow". [With one aspect varying in oscillatory fashion then when that aspect decreases there must be some "place" for its energy to go, a place in which it is stored until it reappears in that aspect when it increases again. It cannot completely disappear or be lost because the oscillation would die.] That "place" is the oscillation's second aspect and it obviously must vary in a manner related to the first aspect's variation, but with its energy storage in opposite phase.

A pendulum, for example, oscillates by the motion (flow) of its swinging mass between peak height in the gravitational field (potential energy) at each end of the swing and peak speed of motion (kinetic energy) at the mid-point between the ends of the swing.

The outward flow has to be of the same form as the spherical oscillation that generates it, the $[1 - \cos(2\pi ft)]$ form. As developed in the preceding Section 3, the flow is a carrier of light and travels outward under the same influence or control as does light: that which we call the permeability and dielectric of free space, μ_0 and ϵ_0 and, consequently, the speed of light. The μ_0 and ϵ_0 , like electric inductance and capacitance, support the two aspects of the oscillation between which the energy exchanges back and forth.

But, when the original oscillation came into existence it did so in absolute nothing. There was no “free space” with μ_0 and ε_0 . There was nothing but the original oscillation. And, after the immediate explosion into all of the particles of the universe, each of those particles was propagating its outward flow into *nothing, emptiness*.

Where did the μ_0 and ε_0 come from? The only thing they could have come from was the original oscillation. There is no other possible source because everything else was absolute nothing, “the zero of existence”. Thus the μ_0 and ε_0 are inherent in the substance of the oscillation, which means, μ_0 and ε_0 are also inherent in the outward propagating flow. Each particle’s outward flow contains its μ_0 and ε_0 .

A PARTICLE’S FLOW ENCOUNTERING ANOTHER PARTICLE SLOWS ITS OUTWARD FLOW

In a universe of the myriad particles resulting from the Big Bang, each of those particles propagating its own outward flow radially in all directions, there are many instances of the flow from one particle [the “source” particle] encountering, running into, another particle [the “encountered” particle]. Such “source” particle flows are inverse square reduced in magnitude the farther that their wave front has traveled from its “source”.

The flow behavior is analogous to that of an electric transmission line where the rate of travel of an oscillation down the line is determined by the time it takes to build up the electric current for each oscillation cycle through each infinitesimal increment of the line’s distributed series inductance [L_p] and to build up the electric potential for each oscillation cycle on each infinitesimal increment [C_p] of the line’s distributed shunt capacitance. The transmission line speed of flow is determined by the well-established relationship equation (6-10).

$$(6-1) \quad \text{Speed} = \frac{1}{\sqrt{L_p \cdot C_p}}$$

For particles’ oscillating outward flow the factor determining the speed of propagation is the time required to build up the flow amount for each oscillation cycle through each infinitesimal increment of the flow’s μ_0 and the flow’s potential for each oscillation cycle on each infinitesimal increment of the flow’s ε_0 . But, in radially outward propagating particle’s flow, the flow amount is inverse square spread out and the potential likewise both in exactly the same proportion as its μ_0 and ε_0 . The ratio of the flow amount to its μ_0 and of its flow potential to its ε_0 remains constant, and so likewise the speed, radially outward, of its propagation, c .

Upon encountering another particle that arriving flow’s μ_0 and ε_0 (scalar not vector and much inverse square reduced) combine with the (full magnitude) μ_0 and ε_0 in the new outgoing propagation of the encountered center, the μ_0 sum and the ε_0 sum each therefore being increased values. The result is that that “encountered” particle’s new outward flow is slowed relative to its natural otherwise speed. That is, its speed of flow is determined by a combination of the parameters μ_0 and ε_0 larger than its flow’s otherwise natural values. The speed of flow is determined by the well-established relationship

$$(6-2) \quad \text{Speed} = \frac{1}{\sqrt{\mu_0 \cdot \epsilon_0}}$$

THE OUTWARD FLOW HAS MOMENTUM

The oscillating substance of each of the myriad particles has its mass. There is no other place or thing to be the mass of those particles. Therefore the propagating outward flow has momentum, the inherent effect of the product of mass, inherent in the substance of the flow, and the flow's velocity.

In the absence of other effects the outward flow is naturally radially outward. While the outward flow effectively transmits pulses of momentum outward in its $[1 - \text{Cos}(2\pi ft)]$ oscillation, the core source of that flow is experiencing radially inward equal but opposite pulses of momentum in accordance with Newton's third law of motion [every action has an equal opposite reaction]. In effect the core source is under reaction compression. Because that effect is normally radially uniform it produces no net affect on the particle.

GRAVITATION IS THE MOMENTUM REACTION TO OUTWARD FLOW SLOWING.

The incoming flow from a distant "source" particle having the effect of slowing the speed of the "encountered" particle's outward propagated flow causes that "encountered" particle's outward flow to have less momentum than if it were not slowed, again momentum being the product of mass and velocity.

Therefore the Newton's Third Law reaction to that reduced outward flow momentum, the reaction back on the "encountered" particle, is smaller than otherwise. That effect takes place on the side of the "encountered particle" facing toward the "source" particle from which the slowing-causing flow came.

But, on the opposite side of the "encountered" particle no such slowing of its outward propagated flow is present so that the outward flow there has the full natural momentum and the Newton's Third Law reaction on the particle on that side is the full natural amount. Consequently, the "encountered" particle experiences its usual full momentum reaction back on itself on its side opposite the side facing the incoming flow from the "source" but experiences reduced reaction back on itself on its side facing the incoming flow from the "source". That is, the "encountered" particle experiences a net momentum reaction toward the "source" particle from which the slowing-causing flow came.

Thus the particle experiences $[1 - \text{Cos}(2\pi ft)]$ pulses of momentum increase toward the "source" which is a gravitational acceleration toward the "source" attracting particle.

SUMMARY AND CONCLUSION

The Universe's matter came into existence in the only possible form that avoids an impossible infinite rate of change and satisfies the requirement of conservation: a pair of oscillations of the form $\pm[1 - \text{Cos}(2\pi ft)]$. Witnessed by we here addressing the issue, those did not mutually annihilate because, being unstable, they exploded into the myriad particles of the universe before annihilation could occur.

Those myriad particles cannot avoid, must inevitably, propagate similar oscillatory outward flow and have been doing so for billions of years. Their outward flow is at $\text{Speed} = \frac{1}{\sqrt{\mu_0 \cdot \epsilon_0}}$ because the μ_0 and ϵ_0 are inherent in its flow.

That particle's outward flow encountering another particle slows the encountered's outward flow on the side encountered because the μ_0 and ϵ_0 of the incoming flow add to the μ_0 and ϵ_0 of the encountered particle's outward flow so that the encountered's speed of outward flow there is slowed.

That reduces the encountered particle's outward flow momentum there and its reaction back on that side of the encountered particle while on the encountered particle's opposite side the flow and reaction momentum remain unchanged.

The result is momentum increments accelerating the encountered particle toward the source of the slowing-causing flow, which is gravitational acceleration.

A practical transition from pure theory to actual material practice is always necessary. The following Section 7, "Gravitation Control Methods and Mechanisms Design" addresses that issue.

