Real time Gravity

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All there is in the Universe is objects of mass m moving in space (x, y, z) at a location **r** = **r** (x, y, z). The state of any object in the Universe can be expressed as the product **S** = m **r**; State = mass x location:

P = d **S**/d t = m (d **r**/d t) + (dm/d t) **r** = Total moment

= change of location + change of mass

= m v + m' r; v = velocity = d r/d t; m' = mass change rate

F = d **P**/d t = d^2**S**/dt^2 = Total force

= m (d^2**r**/dt^2) +2(dm/d t) (d **r**/d t) + (d^2m/dt^2) **r**

= m **γ** + 2m'**v** +m'' **r**; γ = acceleration; m'' = mass acceleration rate

Real time is present time or what our perception see. We can not see or measure something that had not happened. We measure things that already had happened. What happened is not what is seen or mesured. We measure in present time what happened in pas time as follows:

Present time = present time

Present time = past time + [present time - past time]

Present time = past time + time delays

Real time physics = past time physics + corrections

Real time physics = event time physics + time delays effects

What one sees is relativistic = what happened in an event + relativistic effects

What happened in an event is absolute = real time physics - real time relativistic effects.

These relativistic effects are scientific corrections.

A location r (0) measured can be seen live misplaced. A visual displacemnt of an object loaction can be as longer or shorter and this fact introduces a tarnslation factor Exp λ t or could be seen shorter or longer and transalted by a Exp í ω (r) t totaling to:

Exp [λ (r) + í ω (r)] t

The location r (0) measured can be seen live as r = r (0) Exp [λ (r) + í ω (r)] t. When I talk about r (0) that does not mean that r (0) is a constant and not differentiable with respect to time. The quantity r (0) is the event location that we later see as something different as the new location r = r (0) Exp [λ (r) + í ω (r)] t. In a similar manner:

Event time is like a frame or a freeze of time or like a picture of an event t = 0. The event picture when compared to real time freeze t = T picture these two pictures do not look the same. In general:

Quantity	Event time formula	Real time physics formulas
1-**Distance**	r (0)	r = r (0) Exp [λ (r) + í ω (r)] t
2-**Mass**	m (0)	m = m (0) Exp [λ (m) + í ω (m)] t
3-**Time**	t (0)	t = t (0) Exp [λ (t) + í ω (t)] t
4- **Velocity**	v (0)	v = {v (0) + [λ (r) + í ω (r)]} Exp [λ (r) + í ω (r)] t
5 - **Acceleration**	γ (0)	γ = {γ (0) + 2 v (0) [λ (t) + í ω (t)] + [λ (r) + í ω (r)] ² r (0)} Exp [λ (r) + í ω (r)] t

1- State: S = m r = mass x location

$S = m(0)\, r(0)\, \{Exp\, [\lambda(m) + í\, \omega(m)]\, t\} \times \{ Exp\, [\lambda(r) + í\, \omega(r)]\, t \}$
$S = m(0)\, r(0)\, Exp\, \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, t$
$S = S(0)\, Exp\, \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, t$

2 – **Momentum:** P = d S/ d t
$P = \{P(0) + \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, S(0)\}\, Exp\, \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, t$

3 - Force: F = d p/ d t
$F = \{F(0) + 2\{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, p(0) + \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}^2\, S(0)\} \times Exp\, \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, t$

S (0) = **m (0) r (0)**; State = mass x location:
P (0) = d **S (0)**/d t = m [d **r (0)** /d t] + [d m (0)/d t) **r** (0) = Total moment
= change of location + change of mass
= m (0) **v** (0) + m' (0) **r (0)**; v (0) = velocity = d r (0)/d t; m' (0) = mass change rate
F (0) = d **P (0)** /d t = d^2**S (0)** /d t^2 = Total force
= m (0) (d^2 **r (0)** /d t^2) +2 [d m (0)/d t] [d **r (0)**/d t] + [d^2 m (0)/d t^2] **r (0)**
= m (0) **γ** (0) + 2m**' (0) v** (0) +m**'' (0) r (0)**
And γ (0) = acceleration; m'' (0) = mass acceleration rate

1- An observer looking at an object of mass m (0) at a location r (0) He will see the object with as state S (0) = m (0) r (0) as $S = S(0)\, Exp\, \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, t$
Or **$S = m(0)\, r(0)\, Exp\, \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, t$**
2- An observer looking at an object momentum P (0) he will see:
$P = \{P(0) + \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, S(0)\}$
$Exp\, \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, t$
Or, $P = \{[m(0)\, \mathbf{v}(0) + m'(0)\, r(0)] + \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, m(0)\, r(0)\} \times Exp\, \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, t$

3- An observer looking at the force on an object F (0) he will see:

$F = \{F(0) + 2\{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, p(0) + \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}^2\, S(0)\} \times Exp\, \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, t$

$F = \{[\, m(0)\, \boldsymbol{\gamma}(0) + 2m'(0)\, \mathbf{v}(0) + m''(0)\, \mathbf{r}(0)] + 2\{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, [m(0)\, \mathbf{v}(0) + m'(0)\, \mathbf{r}(0)] + \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}^2\, m(0)\, \mathbf{r}(0)\} \times Exp\, \{[\lambda(m) + \lambda(r)] + í\, [\omega(m) + \omega(r)]\}\, t$

a - Assume an object with constant mass that is m' (0) = m'' (0) = 0, then:

$F = \{[m (0) \gamma (0)] + 2\{[\lambda (m) + \lambda (r)] + i [\omega (m) + \omega (r)]\} [m (0) \mathbf{v} (0)] + \{[\lambda (m) + \lambda (r)] + i [\omega (m) + \omega (r)]\}^2 m (0) \mathbf{r (0)}\} \times \text{Exp} \{[\lambda (m) + \lambda (r)] + i [\omega (m) + \omega (r)]\} t$

Or $F = m (0) \{\gamma (0) + 2\{[\lambda (m) + \lambda (r)] + i [\omega (m) + \omega (r)]\} \mathbf{v} (0) + \{[\lambda (m) + \lambda (r)] + i [\omega (m) + \omega (r)]\}^2 \mathbf{r (0)}\}\} \text{Exp} \{[\lambda (m) + \lambda (r)] + i [\omega (m) + \omega (r)]\} t$

b - Assume the object has no mass decay or obit decay: $\lambda (m) = \lambda (r) = 0$. Then:

$\mathbf{F} = m (0) \{\gamma (0) + 2 i [\omega (m) + \omega (r)] \mathbf{v} (0) - [\omega (m) + \omega (r)]^2 \mathbf{r (0)}\} \text{Exp } i [\omega (m) + \omega (r)] t$

For a non decaying constant mass object m (0) at a location r (0) moving with a velocity v (0) and accelerating rate γ (0) how would we see the real time force? We encounter the force as:

$\mathbf{F} = m (0) \{\gamma (0) + 2 i [\omega (m) + \omega (r)] \mathbf{v} (0) - [\omega (m) + \omega (r)]^2 \mathbf{r} (0)\} \text{Exp } i [\omega (m) + \omega (r)] t$

If in event time $v (0) = \gamma (0) = 0$; that is freezing time

Then we see **F** at a later time t

$\mathbf{F} = - m (0) [\omega (m) + \omega (r)]^2 \mathbf{r} (0) \text{Exp } i [\omega (m) + \omega (r)] t$

Meaning observing relative force

Then the relative observed $\mathbf{F} = - m (0) \mathbf{r} (0) [\omega (m) + \omega (r)]^2 \text{Exp } i [\omega (m) + \omega (r)] t$

$\mathbf{F} = - m (0) [\omega (m) + \omega (r)]^2 \mathbf{r}$

$\mathbf{F} = \{- m (0) [\omega (m) + \omega (r)]^2 r\} \mathbf{r} (1)$

With observed ω (r) as **orbital** motion frequency and ω (m) as **rotational** frequency and a total frequency of $[\omega (m) + \omega (r)]$. In practice: $[\omega (r) + \omega (m)]$ is a frequency number.

$\mathbf{F} = \{- m (0) [\omega (m) + \omega (r)]^2 r\} \mathbf{r} (1)$

$F = - m (0) [\omega (m) + \omega (r)]^2 r$

And average $\langle F \rangle = - m (0) [\omega (m) + \omega (r)]^2 \langle r \rangle$

From observational Kepler's third law $\langle r \rangle^3 = \text{Constant} \times [\omega (m) + \omega (r)]^2$

And $\langle F \rangle = - m (0) k / \langle r \rangle^2$

From Central Force Areal velocity law: $r^2 = \text{constant} \times [\omega (m) + \omega (r)]$; and

$F = - m (0) [\text{constant}/r^3]$

In time domain: $\mathbf{F} = \{- m (0) [\omega (m) + \omega (r)]^2 r\} \mathbf{r} (1)$

This like an oscillator or a string with period $[\omega (m) + \omega (r)]$

In phase domain:
1- Force averaged as: $F = \langle F \rangle = - m (0) k/ \langle r \rangle^2 = - GmM/r^2$
2 - $F = - m [GM/r^2 + k/r^3]$?
3 - $F = - m [GM/r^2 + k/r^3 + k'/ (r^2)^2 + ---] = - m [GM/r^2] \text{Exp} (- k/r)$?
All these three equations fit experimental data

Let us see how this work in phase domain
Case I: Average force: $F = - GmM/r^2 = - m (0) k/r^2$

With $d^2 (m r)/dt^2 - (m r) \theta'^2 = -GmM/r^2$ Newton's Gravitational Equation (1)
And $d (m^2r^2\theta')/d t = 0$ Central force law (2)

(2): $d (m^2r^2\theta')/d t = 0$

Then $m^2r^2\theta' = \text{constant}$
$= H (0, 0); H = H (\theta = 0, t = 0)$
$= m^2 (0, 0) h (0, 0); h (0, 0) = r^2 (0, 0) \theta'(0, 0)$
$= m^2 (0, 0) r^2 (0, 0) \theta'(0, 0); h (\theta, 0) = [r^2 (\theta, 0)] [\theta'(\theta, 0)]$
$= [m^2 (\theta, 0)] h (\theta, 0); h (\theta, 0) = [r^2 (\theta, 0)] [\theta'(\theta, 0)]$
$= [m^2 (\theta, 0)] [r^2 (\theta, 0)] [\theta'(\theta, 0)]$
$= [m^2 (\theta, t)] [r^2 (\theta, t)] [\theta' (\theta, t)]$
$= [m^2(\theta, 0) m^2(0,t)][r^2(\theta,0)r^2(0,t)][\theta'(\theta, t)]$
$= [m^2(\theta, 0) m^2(0,t)][r^2(\theta,0)r^2(0,t)][\theta'(\theta, 0) \theta' (0, t)]$

With $m^2r^2\theta' = \text{constant}$
Differentiate with respect to time
Then $2mm'r^2\theta' + 2m^2rr'\theta' + m^2r^2\theta'' = 0$
Divide by $m^2r^2\theta'$
Then $2 (m'/m) + 2(r'/r) + \theta''/\theta' = 0$
This equation will have a solution $2 (m'/m) = 2[\lambda (m) + i \omega (m)]$
And $2(r'/r) = 2[\lambda (r) + i \omega (r)]$
And $\theta''/\theta' = -2\{\lambda (m) + \lambda (r) + i [\omega (m) + \omega (r)]\}$

Then $(m'/m) = [\lambda (m) + i \omega (m)]$
Or $d m/m d t = [\lambda (m) + i \omega (m)]$
And $dm/m = [\lambda (m) + i \omega (m)] d t$
Then $m = m (0) \text{Exp} [\lambda (m) + i \omega (m)] t$
$m = m (0) m (0, t); m (0, t) \text{Exp} [\lambda (m) + i \omega (m)] t$
With initial spatial condition that can be taken at $t = 0$ anywhere then $m (0) = m (\theta, 0)$
And $m = m (\theta, 0) m (0, t) = m (\theta, 0) \text{Exp} [\lambda (m) + i \omega (m)] t$; Exp = Exponential
And $m (0, t) = \text{Exp} [\lambda (m) + i \omega (m)] t$
Similarly we can get
Also, $r = r (\theta, 0) r (0, t) = r (\theta, 0) \text{Exp} [\lambda (r) + i \omega (r)] t$
With $r (0, t) = \text{Exp} [\lambda (r) + i \omega (r)] t$

Then $\theta'(\theta, t) = \{H(0, 0)/[m^2(\theta,0) r(\theta,0)]\}\text{Exp}\{-2\{[\lambda(m) + \lambda(r)]t + i [\omega(m) + \omega(r)]t\}\}$ -----I

And $\theta'(\theta, t) = \theta'(\theta, 0)]\}$ Exp $\{-2\{[\lambda(m) + \lambda(r)]\, t + i\, [\omega(m) + \omega(r)]\, t\}\}$ ----------I
And, $\theta'(\theta, t) = \theta'(\theta, 0)\, \theta'(0, t)$
And $\theta'(0, t) =$ Exp $\{-2\{[\lambda(m) + \lambda(r)]\, t + i\, [\omega(m) + \omega(r)]\, t\}$
Also $\theta'(\theta, 0) = H(0, 0)/ m^2(\theta, 0)\, r^2(\theta, 0)$
And $\theta'(0, 0) = \{H(0, 0)/ [m^2(0, 0)\, r(0, 0)]\}$

<u>With (1)</u>: $d^2(m\, r)/dt^2 - (m\, r)\, \theta'^2 = -GmM/r^2 = -Gm^3M/m^2r^2$
And $d^2(m\, r)/dt^2 - (m\, r)\, \theta'^2 = -Gm^3(\theta, 0)\, m^3(0, t)\, M/ (m^2r^2)$
Let $m\, r = 1/u$
Then $d(m\, r)/d\, t = -u'/u^2 = -(1/u^2)(\theta')\, d\, u/d\, \theta = (-\theta'/u^2)\, d\, u/d\, \theta = -H\, d\, u/d\, \theta$
And $d^2(m\, r)/dt^2 = -H\theta' d^2u/d\theta^2 = -Hu^2\, [d^2u/d\theta^2]$

$-H^2u^2\, [d^2u/d\theta^2] - (1/u)\, (Hu^2)^2 = -Gm^3(\theta, 0)\, m^3(0, t)\, Mu^2$
$[d^2u/ d\theta^2] + u = Gm^3(\theta, 0)\, m^3(0, t)\, M/ H^2$

$t = 0$; $m^3(0, 0) = 1$
$u = Gm^3(\theta, 0)\, M/ H^2 + A$ cosine $\theta = Gm(\theta, 0)\, M(\theta, 0)/ h^2(\theta, 0)$

And $m\, r = 1/u = 1/ [Gm(\theta, 0)\, M(\theta, 0)/ h(\theta, 0) + A$ cosine $\theta]$
$= [h^2/ Gm(\theta, 0)\, M(\theta, 0)]/ \{1 + [Ah^2/ Gm(\theta, 0)\, M(\theta, 0)]$ [cosine $\theta]\}$
$= [h^2/Gm(\theta, 0)\, M(\theta, 0)]/ (1 + \varepsilon$ cosine $\theta)$

Then $m(\theta, 0)\, r(\theta, 0) = [a(1-\varepsilon^2)/ (1+\varepsilon\cos\theta)]\, m(\theta, 0)$
Dividing by $m(\theta, 0)$
Then $r(\theta, 0) = a(1-\varepsilon^2)/ (1+\varepsilon\cos\theta)$
This is Newton's Classical Equation solution of two body problem which is the equation of an ellipse of semi-major axis of length a and semi minor axis $b = a\sqrt{(1 - \varepsilon^2)}$ and focus length $c = \varepsilon\, a$
And $m\, r = m(\theta, t)\, r(\theta, t) = m(\theta, 0)\, m(0, t)\, r(\theta, 0)\, r(0, t)$
Then, $r(\theta, t) = [a(1-\varepsilon^2)/ (1+\varepsilon\cos\theta)]\, \{$Exp $[\lambda(r) + i\, \omega(r)]\, t\}$ ---------- II
This is Newton's time dependent equation that is missed for 350 years
If $\lambda(m) \approx 0$ fixed mass and $\lambda(r) \approx 0$ fixed orbit; then
Then $r(\theta, t) = r(\theta, 0)\, r(0, t) = [a(1-\varepsilon^2)/ (1+\varepsilon$ cosine $\theta)]$ Exp $i\, \omega(r)\, t$
And $m = m(\theta, 0)$ Exp $[i\, \omega(m)\, t] = m(\theta, 0)$ Exp $i\, \omega(m)\, t$

We Have $\theta'(0, 0) = h(0, 0)/r^2(0, 0) = 2\pi ab/ Ta^2(1-\varepsilon)^2$
$= 2\pi a^2\, [\sqrt{(1-\varepsilon^2)}]/T\, a^2(1-\varepsilon)^2$
$= 2\pi\, [\sqrt{(1-\varepsilon^2)}]/T\, (1-\varepsilon)^2$

Then $\theta'(0, t) = \{2\pi\, [\sqrt{(1-\varepsilon^2)}]/ T(1-\varepsilon)^2\}$ Exp $\{-2[\omega(m) + \omega(r)]\, t$
$= \{2\pi\, [\sqrt{(1-\varepsilon^2)}]/ (1-\varepsilon)^2\}\, \{$cosine $2[\omega(m) + \omega(r)]\, t - i$ sin $2[\omega(m) + \omega(r)]\, t\}$

And $\theta'(0, t) = \theta'(0, 0)\, \{1- 2\sin^2 [\omega(m) + \omega(r)]\, t\}$
$- i\, 2i\, \theta'(0, 0)$ sin $[\omega(m) + \omega(r)]\, t$ cosine $[\omega(m) + \omega(r)]\, t$

Then $\theta'(0, t) = \theta'(0, 0)\, \{1 - 2\text{sine}^2\, [\omega(m)\, t + \omega(r)\, t]\}$

$- 2i\ \theta'(0, 0) \sin [\omega (m) + \omega(r)]\ t \text{ cosine } [\omega (m) + \omega(r)]\ t$

$\Delta\ \theta' (0, t) = \text{Real } \Delta\ \theta' (0, t) + \text{Imaginary } \Delta\ \theta (0, t)$
$\text{Real } \Delta\ \theta (0, t) = \theta'(0, 0)\ \{1 - 2 \sin^2 [\omega (m)\ t\ \omega(r)\ t]\}$

Let $W (ob) = \Delta\ \theta' (0, t) \text{ (observed)} = \text{Real } \Delta\ \theta (0, t) - \theta'(0, 0)$
$= -2\theta'(0, 0) \sin^2 [\omega (m)\ t + \omega(r)\ t]$
$= -2[2\pi [\sqrt{(1-\varepsilon^2)}]/T (1-\varepsilon)^2] \sin^2 [\omega (m)\ t + \omega(r)\ t]$

$W (ob) = -4\pi\ \{[\sqrt{(1-\varepsilon^2)}]/T (1-\varepsilon)^2]\} \sin^2 [\omega (m)\ t + \omega(r)\ t]$

If this apsidal motion is to be found as visual effects, then
With, $v° = \text{spin velocity}$; $v^* = \text{orbital velocity}$; $v°/c = \tan \omega (m)\ T°$; $v^*/c = \tan \omega (r)\ T^*$
Where $T°$ = spin period; T^* = orbital period

And $\omega (m)\ T° = \text{Inverse tan } v°/c$; $\omega (r)\ T^* = \text{Inverse tan } v^*/c$
$W (ob) = -4\pi [\sqrt{(1-\varepsilon^2)}]/T (1-\varepsilon)^2] \sin^2 [\text{Inverse tan } v°/c + \text{Inverse tan } v^*/c]$ radians
Multiplication by $180/\pi$

$W (ob) = (-720/T)\ \{[\sqrt{(1-\varepsilon^2)}]/ (1-\varepsilon)^2\} \sin^2 \{\text{Inverse tan } [v°/c + v^*/c]/ [1 - v°\ v^*/c^2]\}$
degrees and multiplication by 1 century = 36526 days and using T in days

$W° (ob) = (-720x36526/Tdays)\ \{[\sqrt{(1-\varepsilon^2)}]/ (1-\varepsilon)^2\}$ x
$\sin^2 \{\text{Inverse tan } [v°/c + v^*/c]/ [1 - v°\ v^*/c^2]\}$ degrees/100 years

<u>Approximations I</u>

With $v° << c$ and $v^* << c$, then $v°\ v^* <<< c^2$ and $[1 - v°\ v^*/c^2] \approx 1$
Then $W° (ob) \approx (-720x36526/Tdays)\ \{[\sqrt{(1-\varepsilon^2)}]/ (1-\varepsilon)^2\}$ x $\sin^2$ Inverse tan $[v°/c + v^*/c]$
degrees/100 years

<u>Approximations II</u>

With $v° << c$ and $v^* << c$, then sine Inverse tan $[v°/c + v^*/c] \approx (v° + v^*)/c$

$W° (ob) = (-720x36526/Tdays)\ \{[\sqrt{(1-\varepsilon^2)}]/ (1-\varepsilon)^2\}$ x $[(v° + v^*)/c]^2$ degrees/100 years
This is the equation that gives the correct apsidal motion rates ----------III

The circumference of an ellipse: $2\pi a (1 - \varepsilon^2/4 + 3/16(\varepsilon^2)^2 - --.) \approx 2\pi a (1-\varepsilon^2/4)$; $R = a (1-\varepsilon^2/4)$

From Newton's laws for a circular orbit: $m v^2/ r (cm) = GmM/r^2$; $r (cm) = [M/m + M]\ r$
Then $v^2 = [GM\ r (cm)/ r^2] = GM^2/ (m + M)\ r$
And $v = \sqrt{[GM^2/ (m + M)\ r = a (1-\varepsilon^2/4)]}$

And $v^* = v (m) = \sqrt{[GM^2/ (m + M)\ a (1-\varepsilon^2/4)]} = 48.14$ km [Mercury] = $v^*(p)$
And $v^* (M) = \sqrt{[Gm^2 / (m + M)\ a (1-\varepsilon^2/4)]} = v^* (s)$

1- Planet Mercury 43" seconds of arc per century elliptical orbit axial rotation rate
W° (ob) = (-720x36526/Tdays) $\{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2\}$ x $[(v^\circ + v^*)/c]^2$ degrees/100 years
W" (ob) = (-720x36526x3600/T) $\{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2\}$ $(v/c)^2$ seconds of arc per century
The circumference of an ellipse: $2\pi a\,(1 - \varepsilon^2/4 + 3/16(\varepsilon^2)^2 - \text{---}) \approx 2\pi a\,(1-\varepsilon^2/4)$; $R = a\,(1-\varepsilon^2/4)$
With $v = \sqrt{[G\,m\,M / (m + M)\,a\,(1-\varepsilon^2/4)]} \approx \sqrt{[GM/a\,(1-\varepsilon^2/4)]}$; m<<M; Solar system
G =6.673x10^-11; M=2x10^30kg; m = 0.32x10^24kg
$\varepsilon = 0.206$; T=88days; c = 299792.458 km/sec; a = 58.2x10^9m; r=2420km
Calculations yields: $(1-\varepsilon^2/4) = 0.989391$
With $v = \sqrt{[G\,M / a\,(1-\varepsilon^2/4)]} = 48.14$km/sec, and $[\sqrt{(1-\varepsilon^2)}]\,(1-\varepsilon)^2 = 1.552$
W (ob) = (-720x36526x3600/88) x (1.552) $(48.14/299792)^2$=43.0"/century
This is the solution to Mercury's 43" seconds of arc per century without space-time fictional forces or space-time fiction

2- Venus Advance of perihelion solution:
W" (ob) = (-720x36526x3600/T) $\{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2\}$ $[(v^\circ + v^*)/c]^2$ seconds/100 years
Data: T=244.7days $v^\circ = v^\circ_{(p)} = 6.52$km/sec; $\varepsilon = 0.0.0068$;
Calculations
With $1-\varepsilon = 0.0068$; $(1-\varepsilon^2/4) = 0.99993$; $[\sqrt{(1-\varepsilon^2)}] / (1-\varepsilon)^2 = 1.00761$
And G=6.673x10^-11; $M_{(0)}$ = 1.98892x19^30kg; R = 108.2x10^9m
And $v\,(p) = \sqrt{[GM/ a\,(1-\varepsilon^2/4)]} = 35.12$ km/sec
Advance of perihelion of Venus motion is given by this formula:
W" (ob) = (-720x36526x3600/T) $\{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2\}$ sine^2 [Inverse tan (v/c)]
With $v = v^* + v^\circ$ = 35.12km/sec + 6.52km/sec = 41.64km/sec
W" (ob) = (-720x36526x3600/T) $\{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2]\}$ $[(v^\circ + v^*)/c]^2$ seconds/100 years
W" (ob) = (-720x36526x3600/T) $\{[\sqrt{(1-\varepsilon^2)}]/(1-\varepsilon)^2\}$ sine^2 [Inverse tan 41.64/300,000]
= (-720x36526x3600/244.7) (1.00762) $(41.64/300{,}000)^2$ = 7.51"/century
W" (observed) = 8.4" +/- 4.8" /100years
This is an excellent result within scientific errors
Case II:
2 - $F = - m\,[GM/r^2 + k/r^3]$
Case III
3 - $F = - m\,[GM/r^2 + k/r^3 + k'/(r^2)^2 + k''/r^5 + \text{---}]$; k, k', k"...Etc are constants.
$= - m\,[GM/r^2]\,\text{Exp}\,(k/r)$
$\approx - m\,[GM/r^2 + k/r^3]$
Case II and case III gives the same excellent results
State S = m r
If m = 0, or r = 0, then there is no force
$F = m\,\boldsymbol{\gamma} + 2m'\mathbf{v} + m''\,\mathbf{r}$
If m = 0; then m' = 0 and m" = 0 making F = 0
If r = 0; then r' = 0 and r" = 0 making F = 0
In planetary motion r > 0; means observer and observed are not at one point.

Conclusion: Gravity exists if and only if m = mass ≠ 0 and location = r ≠ 0.

The properties of gravity are:

As long as that $m \neq 0$ and $r \neq 0$ then there is gravity.

1 - If an object has no mass then it does not exist.
2 - If observed and observant is the same meaning $r = 0$ then gravity can not be measured even if it does exist.

Questions

Q 1 - Could gravity be a contact action that changes location and maybe mass?
A 1 Not exactly: if $m \neq 0$ and $r \neq 0$ then there is gravity. Contact action or not does not matter. What contact action does is change gravity value.
Q 2 - Does decay action emissions and fragmentation produce gravity?
A 2 Decay action changes mass and mass change produces a change of force and a change of force changes the value of gravity. And process that changes mass changes the value of gravity but once an object with mass $m \neq 0$ and $r \neq 0$ then there is gravity

Expressions:
Expressions like gravitational force or a gravitational field or energy field.... Etc has no value in terms of defining gravity. Such expressions are narrative methods and not science.

Summary: All there is in the Universe is objects of mass m moving in space (x, y, z) at a location
$\mathbf{r} = \mathbf{r}$ (x, y, z). The state of any object in the Universe can be expressed as the product
$\mathbf{S} = m\,\mathbf{r}$; State = mass x location:
$\mathbf{P} = d\,\mathbf{S}/d\,t = m\,(d\,\mathbf{r}/d\,t) + (dm/d\,t)\,\mathbf{r}$ = Total moment
= change of location + change of mass
$= m\,v + m'\,r$; v = velocity = $d\,r/d\,t$; m' = mass change rate
$\mathbf{F} = d\,\mathbf{P}/d\,t = d^2\mathbf{S}/dt^2$ = Total force
$= m\,(d^2\mathbf{r}/dt^2) + 2(dm/d\,t)\,(d\,\mathbf{r}/d\,t) + (d^2m/dt^2)\,\mathbf{r}$
$= m\,\boldsymbol{\gamma} + 2m'\mathbf{v} + m''\,\mathbf{r}$; γ = acceleration; m'' = mass acceleration rate

If $m \neq 0$ and $r \neq 0$ then $F \neq 0$
If $F \neq 0$; then there is gravity
Or: **Gravity exists if and only if $m \neq 0$ and $r \neq 0$**

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