World Journal of Engineering Research and Technology

www.wjert.org

Impact Factor: 8.067 Coden USA: WJERA4

GLOBAL VAN-CONG EFFECTIVE KINETIC, GRAVITATIONAL POTENTIAL, AND TOTAL ENERGIES, OBTAINED IN THE PLANET-SUN INTERACTION SYSTEMS, AND ENHANCED BY OUR EMPIRICAL GLOBAL EFFECTIVE KINETIC PLANET MASS, EXPRESSED AS A FUNCTION OF ANY SPEED (OR ANY RELATIVITY) (43)

Prof. Dr. Huynh Van Cong*

Université de Perpignan Via Domitia, Laboratoire de Mathématiques et Physique (LAMPS), EA 4217, Département de Physique, 52, Avenue Paul Alduy, F-66 860 Perpignan, France.

Article Received on 28/05/2026 **Article Revised on 18/06/2026** **Article Published on 01/07/2026**

***Corresponding Author**

Prof. Dr. Huynh Van Cong

Université de Perpignan Via Domitia, Laboratoire de Mathématiques et Physique (LAMPS), EA 4217, Département de Physique, 52, Avenue Paul Alduy, F-66 860 Perpignan, France.

https://doi.org/10.5281/zenodo.21061884

How to cite this Article: Prof. Dr. Huynh Van Cong*, (2026). Global Van-Cong Effective Kinetic, Gravitational Potential, And Total Energies, Obtained In The Planet-Sun Interaction Systems, And Enhanced By Our Empirical Global Effective Kinetic Planet Mass, Expressed As A Function Of Any Speed (Or Any Relativity) (4). World Journal of Engineering Research and Technology, 12(7), 68–95.

This work is licensed under Creative Commons Attribution 4.0 International license.

ABSTRACT

In this work, we present the new expressions of global effective kinetic, gravitational potential and total energies, obtained in the planet-sun interaction systems, as those given in Equations (4, 5, 6), and enhanced by a new global effective kinetic mass of the planet, as that given in Eq. (1). Some concluding remarks are given as follows. At the low speed v (<< c), c being the light speed, given in the non-relativistic case, they are found to be correct. At v=c, given in the relativistic case, the kinetic energy is found to be equal to: $m \times c^2 \times \left[\frac{2+p}{4}\right]$, $p > 0$, and, in particular, for p=2, to: $m \times c^2$, in good agreement with that proposed by Einstein in 1905[2], m being the rest mass of the planet, as those shown in Tables 2-10 and 11-21 in Appendix 1, for various planet-sun interaction systems.

KEYWORDS: Global effective kinetic-potential-total energies, global effective kinetic mass, light speed, relativity, non-relativity (3rd Newton's Law).

First of all, the numerical results of the planetary parameters such as: the rest planet mass, m, the distance from the planet to the sun at **Perihelion (Aphelion)**, r_P, the planet speed average values $v_{P,Aver.}$ [1], and corresponding Newton ones $v_{P,NL}$, being obtained by a 3rd Newton's Law, the sun mass M, universal gravitational constant G, and light speed c, are found to be given in Tables 1 and 11 in Appendix 1, respectively.

Then, at the electron speed v ($\ll$ c), the 3rd Newton's law indicates that the centrifugal force, $\frac{m\times v^2}{r}$, must constantly counter the centripetal gravitational attractive force, $-\frac{GMm}{r^2}$, as : $\frac{m\times v^2}{r}-\frac{GMm}{r^2}=0$, giving rise to : $m\times v^2=\frac{GMm}{r}$. Therefore, at r=$r_P$, the planet speed given by this Newton's law can be determined by: $v_{P,NL}=\sqrt{\frac{GM}{r_P}}$.

Now, being inspired by the best expression of the kinetic energy of the planet, in motion, with v=c, $\frac{2m\times c^2}{2}$, proposed by Einstein in 1905[2-6], we can propose a **gobal effective kinetic mass**, valid at any v, by[5, 6] :

$$m^*(v;p>0)=m\times(1+p\times\frac{v^2}{c^2}), \qquad (1)$$

increasing with increasing v, and noting that at lowest v: $m^*(v;p)\simeq m$, given in the non-relativistic case, and then, at v=c, given in the relativistic case: $m^*(v=c;p)=m\times(1+p)$.

Then, from Eq. (1), the planet is in motion, due to the **global effective Newton force**:

$$F^*_{GEN}(v;p)\equiv m^*(v;p)\times\frac{dv}{dt}=m\times\left(1+p\times\frac{v^2}{c^2}\right)\times\frac{dv}{dt}, \qquad (2)$$

where $\frac{dv}{dt}$ is its acceleration. Further, it is attracted by the sun of the mass M, due to the **global effective gravitational force**, and defined as:

$$F^*_{GEG}(v;p)\equiv-\frac{GMm^*(v;p)}{r^2}=-\frac{GMm\times(1+p\times\frac{v^2}{c^2})}{r^2}, \qquad (3)$$

Where r is the distace between the sun and the planet.

From Eq. (2), noting that $\frac{dv}{dt}\times dr=vdv$, our **global effective kinetic energy** is defined by:

$$K^*(v;p)\equiv\int F^*_{GEN}(v;p)\times dr=\int m\times\left(1+p\times\frac{v^2}{c^2}\right)\times vdv=m\times v^2\times\left[\frac{2+p\times\frac{v^2}{c^2}}{4}\right]. \qquad (4)$$

Eq. (4) is reduced to the correct result at the lowest v ($\ll$ c) : $\frac{m\times v^2}{2}$, given in the non-relativistic case, and at v=c, to: $K_o(p) \equiv m \times c^2 \times \left[\frac{2+p}{4}\right]$, giving rise to a following assumption, by putting: x=$\frac{2+p}{4}$.

If x is known, then p is determined by : p=4x−2.

For example, **(i)** if x=3/4, then p=1, according to : $K_o(p=1) = (\frac{3}{4}) \times mc^2$, **(ii)** if x=1, then p=2, according to : $\mathbf{K_o(p=2) = mc^2}$, in good accordance with that proposed by Einstein in the relativistic case[2], (iii) if x=5/4, then p=3, according to : $K_o(p=3) = (\frac{5}{4}) \times mc^2$, and so on. This assumption is used to determine $K_o(p)$, given in next Tables 2-10 and 12-21 in Appendix 1.

Further, from Eq. (3), our global effective gravitational energy, $U^*(v, r; p)$, is defined by:

$$U^*(v, r; p) \equiv -\int_{\infty}^{r} F^*_{GEG}(v; p) \times dx \equiv -\int_{\infty}^{r} -\frac{GMm^*(v;p)}{x^2} dx = -\frac{GMm^*(v;p)}{r} = -\frac{GMm\times(1+p\times\frac{v^2}{c^2})}{r},$$

being reduced to the correct result at the lowest v ($\ll$ c) as: $= -\frac{GMm}{r}$, given in the non-relativistic case, and at v=c, to: $-\frac{GMm\times(1+p)}{r}$, given in the relativistic case. Here, we choose: $r = r_P$, being the distance from the planet to the sun at perihelion (or aphelion), and $v_{P,NL} \leq v \leq c$, where the values of $v_{P,NL}$ are given in Tables 1 and 11 in Appendix 1.That gives :

$$U^*(v; p) = -\frac{GMm\times(1+p\times\frac{v^2}{c^2})}{r_P}, \qquad (5)$$

according at v=c to: $U_o(p) \equiv= -\frac{GMm\times(1+p)}{r_P}$, given in the relativistic case.

Therefore, from Equations (4, 5), the **global effective total enegy**, $E^*(v; p)$, is found to be given by:

$$E^*(v; p) \equiv m \times v^2 \times \left[\frac{2+p\times\frac{v^2}{c^2}}{4}\right] - \frac{GMm\times(1+p\times\frac{v^2}{c^2})}{r_P}, \qquad (6)$$

according at v=c to: $E_o(p) = K_o(p) + U_o(p) = m \times v^2 \times \left[\frac{2+p}{4}\right] - \frac{GMm\times(1+p)}{r_P}$.

Furthermore, it is interesting to evaluate the relative errors between $K^*(v; p)$ and $E^*(v; p)$, defined by:

$$RE(v; p) \equiv 1 - \frac{E^*(v;p)}{K^*(v;p)}. \qquad (7)$$

Then, in following Tables 2-10 and 11-21 in Appendix 1, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$ are obtained for p=1, 2 and 3, respectively, using Equations (7, 4, 5, 6), noting that, for a given p, $RE(v;p)$ decreases with increasing v, and at v=c, one obtains $K^*(v;p) \cong E^*(v;p)$, with highest precision.

REFERENCES

1. Sauerheber, R. Electron-Photon Interactions in Atomic Hdrogen: Significance of High (near zero) Energy States. *Int. J. Opt. Photonic Eng.*, 2022; 7(2): 1-13.
2. Einstein, A. Zur Electrodynamik bewegter Köper. *Annalen der Physick*, 1905; 17: 891-921.
3. Hecht, E. How Einstein confirmed $E_o = mc^2$. *Am. J. Phys.*, 2011; 79(6): 591-600.
4. Kou, K. L.A new way to calculate Gravity Force from Mass Total Energy. *Open Access Library Journal*, 2021; 8: 1-10.
5. Van Cong, H. Global Van-Cong Effective Kinetic, Gravitational Potential, and Total Energies, Obtained in the Panet-Sun Interaction System, and Enhanced by our Empirical Global Effective Kinetic Mass of the Planet, Expressed as a Function of any Speed (or any Relativity (38). *WJERT*, 2026; 12(6): 215-229.
6. Van Cong, H. Global Van-Cong Effective Kinetic, Gravitational Potential, and Total Energies, Obtained in the Panet-Sun Interaction System, and Enhanced by our Empirical Global Effective Kinetic Mass of the Planet, Expressed as a Function of any Speed (or any Relativity); Aphelion (39). *WJERT*, 2026; 12(6): 230-246.

APPENDIX 1

A) At Perihelion, we obtain the following numerical results.

Table 1. The numerical results of the planetary parameters are given by: the rest planet mass, m (Kg), the distance from the planet to the sun at **Perihelion**, $r_P(m)$, and the planet speed at **Perihelion**, average values, $v_{P,Aver.}$, and corresponding Newton ones, $v_{P,NL}$, being obtained by a 3rd Newton Law. Further, the sun mass M, universal gravitational constant G, and light speed c, are found to be given respectively by : $M = 1.988475 \times 10^{30}$ kg, $G = 6.6743 \times 10^{-11} \frac{m^3}{kg \times s^2}$, and $c = 2.9979 \times 10^8 \left(\frac{m}{s}\right)$. It should be noted that, for the Moon-Sun interaction system, the value of $v_{P,Aver.} = 1.03 \left(\frac{10^3 \times m}{s}\right)$, given in literature, is completely wrong !!!

Celestial body	m (Kg)	$r_P(m)$	$v_{P,Aver.} \left(\frac{10^3 \times m}{s}\right)$	$v_{P,NL} \left(\frac{10^3 \times m}{s}\right)$
Mercury	3.30101×10^{23}	4.60009×10^{10}	47.87	53.7130
Venus	4.86732×10^{24}	1.07477×10^{11}	35.02	35.1403
Earth	5.97219×10^{24}	1.47100×10^{11}	29.78	30.0370
Mars	6.41693×10^{23}	2.06645×10^{11}	24.13	25.3425
Jupiter	1.89852×10^{27}	7.40603×10^{11}	13.06	13.3866
Saturn	5.68460×10^{26}	1.35096×10^{12}	9.64	9.9115
Uranus	8.68192×10^{25}	2.73854×10^{12}	6.79	6.9615
Neptune	1.02431×10^{26}	4.46384×10^{12}	5.43	5.4527
Moon	7.34581×10^{22}	3.62106×10^{8}	1.03	605.4037

Table 2. In the **Mercury-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in Table 1, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$
Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 2.22506339 \times 10^{40}$ J, $U_o(p) = -1.90474291 \times 10^{33}$ J and $E_o(p) = 2.2250632 \times 10^{40}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of $8.56039842 \times 10^{-8}$.				
0.00017917	**2.00000331**	**$2.14009613 \times 10^{-8}$**	**0.50000002**	**$-2.1401034 \times 10^{-8}$**

0.09	7.95826684×10^{-6}	0.00542187	0.50405	0.00542183
0.30	7.44085668×10^{-7}	0.0627	0.545	0.06269996
0.40	4.30992282×10^{-7}	0.1152	0.58	0.11519996
0.60	2.0554629×10^{-7}	0.2832	0.68	0.28319997
0.80	1.24636483×10^{-7}	0.5632	0.82	0.56319998
0.90	1.02110987×10^{-7}	0.7587	0.905	0.75869999
0.95	9.32589377×10^{-8}	0.87316875	0.95125	0.87316874
1	8.56039842×10^{-8}	**1**	**1**	**1**

Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 2.96675118 \times 10^{40}}$ **J, in good agreement with that, proposed by Einstein in 1905**, $U_o(p) = -2.85711437 \times 10^{33}$ J and $E_o(p) = 2.9667509 \times 10^{40}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 9.63044823×10^{-8}.

0.00017917	**2.00000334**	**1.60507213×10^{-8}**	**0.33333335**	**$-1.60507764\times 10^{-8}$**
0.09	7.98998196×10^{-6}	0.00408281	0.33873333	0.00408277
0.30	7.72268359×10^{-7}	0.04905	0.39333333	0.04904997
0.40	4.5661608×10^{-7}	0.0928	0.44	0.09279997
0.60	2.25549713×10^{-7}	0.2448	0.57333333	0.24479997
0.80	1.39465332×10^{-7}	0.5248	0.76	0.52479998
0.90	1.14734212×10^{-7}	0.73305	0.87333333	0.73304999
0.95	1.04885688×10^{-7}	0.85850312	0.935	0.85850312
1	9.63044823×10^{-8}	**1**	**1**	**1**

Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 3.70843898 \times 10^{40}$ J, $U_o(p) = -3.80948582 \times 10^{33}$ J and $E_o(p) = 3.7084386 \times 10^{40}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.02724781×10^{-7}.

0.00017917	**2.00000337**	**1.28405772×10^{-8}**	**0.25000002**	**$-1.28406218\times 10^{-8}$**
0.09	8.02144326×10^{-6}	0.00327937	0.256075	0.00327934
0.30	7.98216299×10^{-7}	0.04086	0.3175	0.04085997
0.40	4.78933581×10^{-7}	0.07936	0.37	0.07935997
0.60	2.40877012×10^{-7}	0.22176	0.52	0.22175997
0.80	1.49452109×10^{-7}	0.50176	0.73	0.50175998
0.90	1.2274127×10^{-7}	0.71766	0.8575	0.71765999
0.95	1.12054385×10^{-7}	0.84970375	0.926875	0.84970374
1	1.02724781×10^{-7}	**1**	**1**	**1**

Table 3. In the **Venus-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in above Table 1, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$
Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 3.28084299 \times 10^{41}$ J, $U_o(p) = -1.20207127 \times 10^{34}$ J and $E_o(p) = 3.28084287 \times 10^{41}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 3.66390978×10^{-8}.				
0.00011722	**1.99999722**	**9.15978731×10^{-9}**	**0.50000001**	**$-9.15976219\times 10^{-8}$**
0.09	3.4061933×10^{-6}	0.00542187	0.50405	0.00542185
0.30	3.18473817×10^{-7}	0.0627	0.545	0.06269998
0.40	1.8446768×10^{-7}	0.1152	0.58	0.11519998
0.60	8.79752348×10^{-8}	0.2832	0.68	0.28319999
0.80	5.33452774×10^{-8}	0.5632	0.82	0.56319999
0.90	4.37042093×10^{-8}	0.7587	0.905	0.75869999
0.95	3.99154708×10^{-8}	0.87316875	0.95125	0.87316875
1	3.66390978×10^{-8}	**1**	**1**	**1**
Here, for **p=2** and at v=c, **$K_o(p) = mc^2 = 4.37445732 \times 10^{41}$ J, in good agreement with that, proposed by Einstein in 1905**, $U_o(p) = -1.80310691 \times 10^{34}$ J and $E_o(p) = 4.37445714 \times 10^{41}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 4.1218985×10^{-8}.				
0.00011722	**1.99999724**	**6.86984053×10^{-9}**	**0.33333334**	**$-6.86954053\times 10^{-9}$**
0.09	3.41976759×10^{-6}	0.00408281	0.33873333	0.00408279
0.30	3.30536204×10^{-7}	0.04905	0.39333333	0.04904999
0.40	1.95434843×10^{-7}	0.0928	0.44	0.09279999
0.60	9.65368387×10^{-8}	0.2448	0.57333333	0.24479999
0.80	5.96921278×10^{-8}	0.5248	0.76	0.52479999
0.90	4.91070372×10^{-8}	0.73305	0.87333333	0.73304999
0.95	4.48918005×10^{-8}	0.85850312	0.935	0.85850312
1	4.1218985×10^{-8}	**1**	**1**	**1**
Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 5.46807165 \times 10^{41}$ J,$U_o(p) = -2.40414255 \times 10^{34}$ J and $E_o(p) = 5.46807141 \times 10^{41}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 4.39669173×10^{-8}.				
0.00011722	**2.40869722**	**4.56335052×10^{-9}**	**0.25000001**	**$-6.42837949\times 10^{-9}$**
0.09	3.43323324×10^{-6}	0.00327937	0.256075	0.00327935
0.30	3.41642102×10^{-7}	0.04086	0.3175	0.04085999
0.40	2.04986888×10^{-7}	0.07936	0.37	0.07935999
0.60	1.03097029×10^{-7}	0.22176	0.52	0.22175999

0.80	6.39665372×10^{-8}	0.50176	0.73	0.50175999
0.90	5.2534×10^{-8}	0.71766	0.8575	0.71765999
0.95	4.79600526×10^{-8}	0.84970375	0.926875	0.84970375
1	4.39669173×10^{-8}	**1**	**1**	**1**

Table 4. In the **Earth-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in above Table 1, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$
Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 4.02558651 \times 10^{41}$ J, $U_o(p) = -1.07764768 \times 10^{34}$ J and $E_o(p) = 4.0255864 \times 10^{41}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 2.67699546×10^{-8}.				
0.00010019	**2.00000036**	**6.69248749×10^{-9}**	**0.50**	**$-6.69249011\times 10^{-9}$**
0.09	2.48869774×10^{-6}	0.00542187	0.50405	0.00542186
0.30	2.32689398×10^{-7}	0.0627	0.545	0.06269999
0.40	1.34779285×10^{-7}	0.1152	0.58	0.11519999
0.60	6.42781395×10^{-8}	0.2832	0.68	0.28319999
0.80	3.89761413×10^{-8}	0.5632	0.82	0.56319999
0.90	3.19320006×10^{-8}	0.7587	0.905	0.7587
0.95	2.91638005×10^{-8}	0.87316875	0.95125	0.87316875
1	2.67699546×10^{-8}	**1**	**1**	**1**
Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 5.36744867 \times 10^{41}}$ **J, in good agreement with that, proposed by Einstein in 1905**, $U_o(p) = -1.61647152 \times 10^{34}$ J and $E_o(p) = 5.36744851 \times 10^{41}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 3.01161989×10^{-8}.				
0.00010019	**2.00000037**	**5.01936564×10^{-9}**	**0.33333334**	**$-5.01936767\times 10^{-9}$**
0.09	2.49861564×10^{-6}	0.00408281	0.33873333	0.00408279
0.30	2.41502648×10^{-7}	0.04905	0.39333333	0.04904999
0.40	1.42792322×10^{-7}	0.0928	0.44	0.09279999
0.60	7.05335813×10^{-8}	0.2448	0.57333333	0.24479999
0.80	4.36133978×10^{-8}	0.5248	0.76	0.52479999
0.90	3.58795175×10^{-8}	0.73305	0.87333333	0.73305
0.95	3.27997012×10^{-8}	0.85850312	0.935	0.85850312
1	3.01161989×10^{-8}	**1**	**1**	**1**
Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 6.70931084 \times 10^{41}$ J, $U_o(p) = -2.15529536 \times 10^{34}$ J and $E_o(p) = 6.70931063 \times 10^{41}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 3.21239455×10^{-8}.				

0.00010019	**2.00000038**	**4.01549253× 10^{-9}**	**0.25000001**	**-4.01549421× 10^{-9}**
0.09	2.50845418× 10^{-6}	0.00327937	0.256075	0.00327936
0.30	2.49617051× 10^{-7}	0.04086	0.3175	0.04085999
0.40	1.49771419× 10^{-7}	0.07936	0.37	0.07935999
0.60	7.5326712× 10^{-8}	0.22176	0.52	0.22175999
0.80	4.6736448× 10^{-8}	0.50176	0.73	0.50175999
0.90	3.83834731 × 10^{-8}	0.71766	0.8575	0.71766
0.95	3.50414858× 10^{-8}	0.84970375	0.926875	0.84970375
1	3.21239455× 10^{-8}	**1**	**1**	**1**

Table 5. In the **Mars-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in above Table 1, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$

Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 4.32536587 \times 10^{40}$ J, $U_o(p) = -8.24248669 \times 10^{32}$ J and $E_o(p) = 4.32536579 \times 10^{40}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.90561606× 10^{-8}.

8.4534×10^{-5}	**2.00000943**	**4.76401772× 10^{-9}**	**0.50**	**-4.76406276× 10^{-9}**
0.09	1.77157655× 10^{-6}	0.00542187	0.50405	0.00542186
0.30	1.65639674× 10^{-7}	0.0627	0.545	0.06269999
0.40	9.59424754× 10^{-8}	0.1152	0.58	0.11519999
0.60	4.57563181× 10^{-8}	0.2832	0.68	0.28319999
0.80	2.77451202× 10^{-8}	0.5632	0.82	0.5632
0.90	2.27307571× 10^{-8}	0.7587	0.905	0.7587
0.95	2.07602171× 10^{-8}	0.87316875	0.95125	0.87316875
1	1.90561606× 10^{-8}	**1**	**1**	**1**

Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 5.7671545 \times 10^{40}}$ **J, in good agreement with that, proposed by Einstein in 1905**, $U_o(p) = -1.236373 \times 10^{33}$ J and $E_o(p) = 5.76715437 \times 10^{40}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 2.14381807× 10^{-8}.

8.4534×10^{-5}	**2.00000944**	**3.57301331× 10^{-9}**	**0.33333334**	**-3.57304712× 10^{-9}**
0.09	1.7786366× 10^{-6}	0.00408281	0.33873333	0.0040828
0.30	1.71913376× 10^{-7}	0.04905	0.39333333	0.04904999
0.40	1.01646547× 10^{-7}	0.0928	0.44	0.09279999
0.60	5.02092468× 10^{-8}	0.2448	0.57333333	0.24479999
0.80	3.10461459× 10^{-8}	0.5248	0.76	0.52479999
0.90	2.55407924× 10^{-8}	0.73305	0.87333333	0.73305

0.95	2.33484286×10^{-8}	0.85850312	0.935	0.85850312
1	2.14381807×10^{-8}	**1**	**1**	**1**

Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4}\times mc^2 = 7.20894312\times 10^{40}$ J, $U_o(p) = -1.64849734\times 10^{33}$ J and $E_o(p) = 7.20894296\times 10^{40}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 2.28673928×10^{-8}.

$\mathbf{8.4534\times 10^{-5}}$ **2.00000945**		**2.85841065**$\times 10^{-9}$	**0.25**	**-2.85843773**$\times 10^{-9}$
0.09	1.78564015×10^{-6}	0.00327937	0.256075	0.00327936
0.30	1.77689604×10^{-7}	0.04086	0.3175	0.04085999
0.40	1.06614608×10^{-7}	0.07936	0.37	0.07935999
0.60	5.36212312×10^{-8}	0.22176	0.52	0.22175999
0.80	3.32692857×10^{-8}	0.50176	0.73	0.50175999
0.90	2.73232301×10^{-8}	0.71766	0.8575	0.71766
0.95	2.49442406×10^{-8}	0.84970375	0.926875	0.84970375
1	2.28673928×10^{-8}	**1**	**1**	**1**

Table 6. In the **Jupiter-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in above Table 1, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \le v \le c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$

Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right)\times mc^2 = 1.27970753\times 10^{44}$ J, $U_o(p) = -6.80433307\times 10^{35}$ J and $E_o(p) = 1.27970752\times 10^{44}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 5.31710009×10^{-9}.

$\mathbf{4.4653\times 10^{-5}}$ **1.99999917**		**1.32927559**$\times 10^{-9}$	**0.50**	**-1.32927449**$\times 10^{-9}$
0.09	4.94309957×10^{-7}	0.00542187	0.50405	0.00542187
0.30	4.62172181×10^{-8}	0.0627	0.545	0.0627
0.40	2.67701222×10^{-8}	0.1152	0.58	0.1152
0.60	1.27670483×10^{-8}	0.2832	0.68	0.2832
0.80	7.74151654×10^{-9}	0.5632	0.82	0.5632
0.90	6.34239572×10^{-9}	0.7587	0.905	0.7587
0.95	5.79257042×10^{-9}	0.87316875	0.95125	0.87316875
1	5.31710009×10^{-9}	**1**	**1**	**1**

Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 1.7062767\times 10^{44}}$ **J**, in good agreement with that, proposed by **Einstein in 1905**, $U_o(p) = -1.02064996\times 10^{36}$ J and $E_o(p) = 1.70627669\times 10^{44}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 5.98173766×10^{-9}.

$\mathbf{4.4653\times 10^{-5}}$ **1.99999917**		**9.96956695**$\times 10^{-10}$	**0.33333333**	**-9.96955873**$\times 10^{-10}$
0.09	4.96279871×10^{-7}	0.0040828	0.33873333	0.0040828

0.30	4.79677231×10^{-8}	0.04905	0.39333333	0.04905
0.40	2.83616872×10^{-8}	0.0928	0.44	0.0928
0.60	1.40095162×10^{-8}	0.2448	0.57333333	0.2448
0.80	8.66257732×10^{-9}	0.5248	0.76	0.5248
0.90	7.1264592×10^{-9}	0.73305	0.87333333	0.73305
0.95	6.51474008×10^{-9}	0.85850312	0.935	0.85850312
1	5.98173766×10^{-9}	**1**	**1**	**1**

Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4}\times mc^2 = 2.13284588\times 10^{44}$ J, $U_o(p) = -1.36086661\times 10^{36}$ J and $E_o(p) = 2.13284586\times 10^{44}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 6.38052022×10^{-9}.

$\mathbf{4.4653\times 10^{-5}}$ **1.99999917**		**7.97565357**$\times\mathbf{10^{-10}}$	**0.25**	**-7.97564701**$\times\mathbf{10^{-10}}$
0.09	4.98234019×10^{-7}	0.00327937	0.256075	0.00327936
0.30	4.95794213×10^{-8}	0.04086	0.3175	0.04086
0.40	2.97478889×10^{-8}	0.07936	0.37	0.07936
0.60	1.49615371×10^{-8}	0.22176	0.52	0.22176
0.80	9.28288357×10^{-9}	0.50176	0.73	0.50176
0.90	7.6237997×10^{-9}	0.71766	0.8575	0.71766
0.95	6.96000757×10^{-9}	0.84970375	0.926875	0.84970375
1	6.38052022×10^{-9}	**1**	**1**	**1**

Table 7. In the **Saturn-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in above Table 1, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \le v \le c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$

Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right)\times mc^2 = 3.83173493\times 10^{43}$ J, $U_o(p) = -1.11689739\times 10^{35}$ J and $E_o(p) = 3.83173492\times 10^{43}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 2.9148608×10^{-9}.

$\mathbf{3.3061\times 10^{-5}}$ **2.00002118**		**7.2870748**$\times\mathbf{10^{-10}}$	**0.50**	**-7.28722913**$\times\mathbf{10^{-10}}$
0.09	2.7098318×10^{-7}	0.00542187	0.50405	0.00542187
0.30	2.53365091×10^{-8}	0.0627	0.545	0.0627
0.40	1.46755144×10^{-8}	0.1152	0.58	0.1152
0.60	6.99895952×10^{-9}	0.2832	0.68	0.2832
0.80	4.24393787×10^{-9}	0.5632	0.82	0.5632
0.90	3.47693296×10^{-9}	0.7587	0.905	0.7587
0.95	3.17551596×10^{-9}	0.87316875	0.95125	0.87316875
1	2.9148608×10^{-9}	**1**	**1**	**1**

Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 5.10897991 \times 10^{43}}$ **J**, in good agreement with that, proposed by **Einstein in 1905**, $U_o(p) = -1.67534608 \times 10^{35}$ J and $E_o(p) = 5.10897989 \times 10^{43}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of $3.27921834 \times 10^{-9}$.

$\mathbf{3.3061 \times 10^{-5}}$ **2.00002118**		**5.4653061**$\times 10^{-10}$	**0.33333333**	**-5.46542186**$\times 10^{-10}$
0.09	$2.72063096 \times 10^{-7}$	0.00408281	0.33873333	0.0040828
0.30	$2.62961447 \times 10^{-8}$	0.04905	0.39333333	0.04905
0.40	$1.55480181 \times 10^{-8}$	0.0928	0.44	0.0928
0.60	$7.68008668 \times 10^{-8}$	0.2448	0.57333333	0.2448
0.80	$4.74886808 \times 10^{-9}$	0.5248	0.76	0.5248
0.90	$3.90676047 \times 10^{-9}$	0.73305	0.87333333	0.73305
0.95	$3.57141294 \times 10^{-9}$	0.85850312	0.935	0.85850312
1	$3.27921834 \times 10^{-9}$	**1**	**1**	**1**

Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 6.38622489 \times 10^{43}$ J, $U_o(p) = -2.23379477 \times 10^{35}$ J and $E_o(p) = 6.38622487 \times 10^{43}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of $3.49783291 \times 10^{-9}$.

$\mathbf{3.3061 \times 10^{-5}}$ **2.00002118**		**4.37224489**$\times 10^{-10}$	**0.25**	**-4.37233749**$\times 10^{-10}$
0.09	$2.73134371 \times 10^{-7}$	0.00327937	0.256075	0.00327937
0.30	$2.71796856 \times 10^{-8}$	0.04086	0.3175	0.04086
0.40	$1.63079409 \times 10^{-8}$	0.07936	0.37	0.07936
0.60	8.2019892×10^{-9}	0.22176	0.52	0.22176
0.80	$5.08892306 \times 10^{-9}$	0.50176	0.73	0.50176
0.90	$4.17940482 \times 10^{-9}$	0.71766	0.8575	0.71766
0.95	$3.81551091 \times 10^{-9}$	0.84970375	0.926875	0.84970375
1	$3.49783291 \times 10^{-9}$	**1**	**1**	**1**

Table 8. In the **Uranus-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in above Table 1, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$
Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 5.85209446 \times 10^{42}$ J, $U_o(p) = -8.41496949 \times 10^{33}$ J and $E_o(p) = 5.85209445 \times 10^{42}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of $1.43794143 \times 10^{-9}$.				
$\mathbf{2.3221 \times 10^{-5}}$ **2.00000514**		**3.59484452**$\times 10^{-10}$	**0.50**	**-3.59486299**$\times 10^{-10}$
0.09	$1.33679785 \times 10^{-7}$	0.00542187	0.50405	0.00542187
0.30	$1.24988536 \times 10^{-8}$	0.0627	0.545	0.0627
0.40	$7.23963600 \times 10^{-9}$	0.1152	0.58	0.1152
0.60	$3.45268436 \times 10^{-9}$	0.2832	0.68	0.2832

0.80	2.09359374×10^{-9}	0.5632	0.82	0.5632
0.90	1.71521952×10^{-9}	0.7587	0.905	0.7587
0.95	1.56652635×10^{-9}	0.87316875	0.95125	0.87316875
1	1.43794143×10^{-9}	**1**	**1**	**1**

Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 7.80279261 \times 10^{42}}$ **J**, in good agreement with that, proposed by **Einstein in 1905**, $U_o(p) = -1.26224542 \times 10^{34}$ J and $E_o(p) = 7.80279260 \times 10^{42}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.61768410×10^{-9}.

$\mathbf{2.3221 \times 10^{-5}}$ **2.00000514**		**2.69613339**$\times 10^{-10}$	**0.33333333**	**-2.69614725**$\times 10^{-10}$
0.09	1.34212522×10^{-7}	0.00408281	0.33873333	0.0040828
0.30	1.29722553×10^{-8}	0.04905	0.39333333	0.04905
0.40	7.67005426×10^{-9}	0.0928	0.44	0.0928
0.60	3.78869391×10^{-9}	0.2448	0.57333333	0.2448
0.80	2.34268294×10^{-9}	0.5248	0.76	0.5248
0.90	1.92725935×10^{-9}	0.73305	0.87333333	0.73305
0.95	1.76182779×10^{-9}	0.85850312	0.935	0.85850312
1	1.61768410×10^{-9}	**1**	**1**	**1**

Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 9.75349076 \times 10^{42}$ J,$U_o(p) = -1.6829939 \times 10^{34}$ J and $E_o(p) = 9.75349075 \times 10^{42}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.72552972×10^{-9}.

$\mathbf{2.3221 \times 10^{-5}}$ **2.00000514**		**2.15690671**$\times 10^{-10}$	**0.25**	**-2.1569178**$\times 10^{-10}$
0.09	1.34740997×10^{-7}	0.00327937	0.256075	0.00327937
0.30	1.34081182×10^{-8}	0.04086	0.3175	0.04086
0.40	8.04493483×10^{-8}	0.07936	0.37	0.07936
0.60	4.04615574×10^{-9}	0.22176	0.52	0.22176
0.80	2.51043675×10^{-9}	0.50176	0.73	0.50176
0.90	2.06175876×10^{-9}	0.71766	0.8575	0.71766
0.95	1.88224480×10^{-9}	0.84970375	0.926875	0.84970375
1	1.72552972×10^{-9}	**1**	**1**	**1**

Table 9. In the **Neptune-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in above Table 1, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$

Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 6.90441616 \times 10^{42}$ J, $U_o(p) = -6.09086043 \times 10^{33}$ J and $E_o(p) = 6.90441615 \times 10^{42}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of $8.82168782\times 10^{-10}$.

1.8188×10^{-5}	**1.99997251**	**2.20545228$\times10^{-10}$**	**0.50**	**-2.20539166$\times10^{-10}$**
0.09	8.2011774$\times10^{-8}$	0.00542187	0.50405	0.00542187
0.30	7.66797437$\times10^{-9}$	0.0627	0.545	0.0627
0.40	4.44147485$\times10^{-9}$	0.1152	0.58	0.1152
0.60	2.11820184$\times10^{-9}$	0.2832	0.68	0.2832
0.80	1.28440769$\times10^{-9}$	0.5632	0.82	0.5632
0.90	1.05227727$\times10^{-9}$	0.7587	0.905	0.7587
0.95	9.61054791$\times10^{-10}$	0.87316875	0.95125	0.87316875
1	8.82168782$\times10^{-10}$	**1**	**1**	**1**

Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 9.20588821\times10^{42}}$ **J**, in good agreement with that, proposed by **Einstein in 1905**, $U_o(p) = -9.13629064\times10^{33}$ J and $E_o(p) = 9.20588820\times10^{42}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 9.92439908$\times10^{-10}$.

1.8188×10^{-5}	**1.99997251**	**1.65408921$\times10^{-10}$**	**0.33333333**	**-1.65404375$\times10^{-10}$**
0.09	8.23386056$\times10^{-8}$	0.00408281	0.33873333	0.0040828
0.30	7.95840338$\times10^{-9}$	0.04905	0.39333333	0.04905
0.40	4.70553407$\times10^{-9}$	0.0928	0.44	0.0928
0.60	2.32434172$\times10^{-9}$	0.2448	0.57333333	0.2448
0.80	1.43722245$\times10^{-9}$	0.5248	0.76	0.5248
0.90	1.18236254$\times10^{-9}$	0.73305	0.87333333	0.73305
0.95	1.08087117$\times10^{-9}$	0.85850312	0.935	0.85850312
1	9.92439908$\times10^{-10}$	**1**	**1**	**1**

Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4}\times mc^2 = 1.15073603\times10^{43}$ J, $U_o(p) = -1.21817209\times10^{34}$ J and $E_o(p) = 1.150736025\times10^{43}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.05860254$\times10^{-9}$.

1.8188×10^{-5}	**1.99997251**	**1.32327137$\times10^{-10}$**	**0.25**	**-1.323235$\times10^{-10}$**
0.09	8.26628215$\times10^{-8}$	0.00327937	0.256075	0.00327937
0.30	8.22580293$\times10^{-9}$	0.04086	0.3175	0.04086
0.40	4.93552099$\times10^{-9}$	0.07936	0.37	0.07936
0.60	2.48229315$\times10^{-9}$	0.22176	0.52	0.22176
0.80	1.54013835$\times10^{-9}$	0.50176	0.73	0.50176
0.90	1.26487709$\times10^{-9}$	0.71766	0.8575	0.71766
0.95	1.15474630$\times10^{-9}$	0.84970375	0.926875	0.84970375
1	1.05860254$\times10^{-9}$	**1**	**1**	**1**

Table 10. In the **Moon-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in above Table 1, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$
Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 4.95148239 \times 10^{39}$ J, $U_o(p) = -5.38467907 \times 10^{34}$ J and $E_o(p) = 4.95142854 \times 10^{39}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.08748828×10^{-5}.				
0.00201943	**2.00000406**	**2.71872627×10^{-6}**	**0.50**	**$-2.71876688\times 10^{-6}$**
0.09	0.001011	0.00542187	0.50405	0.00541645
0.30	9.45264934×10^{-5}	0.0627	0.545	0.06269475
0.40	5.47520142×10^{-5}	0.1152	0.58	0.11519495
0.60	2.61120068×10^{-5}	0.2832	0.68	0.28319568
0.80	1.58334586×10^{-5}	0.5632	0.82	0.56319721
0.90	1.29718847×10^{-5}	0.7587	0.905	0.75869841
0.95	1.18473460×10^{-5}	0.87316875	0.95125	0.87316790
1	1.08748828×10^{-5}	**1**	**1**	**1**
Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 6.60197652 \times 10^{39}}$ **J**, in good agreement with that, proposed by **Einstein in 1905**, $U_o(p) = -8.07701861 \times 10^{34}$ J and $E_o(p) = 6.60189575 \times 10^{39}$ J , suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.22342432×10^{-5}.				
0.00201943	**2.00000814**	**2.03904886×10^{-6}**	**0.33333333**	**-2.0390904×10^{-6}**
0.09	0.00101502	0.00408281	0.33873333	0.00407871
0.30	9.8106741×10^{-5}	0.04905	0.39333333	0.04904579
0.40	5.80071874×10^{-5}	0.0928	0.44	0.09279575
0.60	2.86531839×10^{-5}	0.2448	0.57333333	0.24479598
0.80	1.77172729×10^{-5}	0.5248	0.76	0.52479712
0.90	1.45755029×10^{-5}	0.73305	0.87333333	0.73304828
0.95	1.33243748×10^{-5}	0.85850312	0.935	0.85850219
1	1.22342432×10^{-5}	**1**	**1**	**1**
Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 8.25247065 \times 10^{39}$ J,$U_o(p) = -1.07693581 \times 10^{35}$ J and $E_o(p) = 8.25236296 \times 10^{39}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.30498594×10^{-5}.				
0.00201943	**2.00001222**	**1.63124242×10^{-6}**	**0.25**	**$-1.63128363\times 10^{-6}$**
0.09	0.00101902	0.00327937	0.256075	0.00327607
0.30	0.0001014	0.04086	0.3175	0.04085639
0.40	6.08423383×10^{-5}	0.07936	0.37	0.07935621
0.60	3.06003196×10^{-5}	0.22176	0.52	0.22175611

0.80	1.89859641×10^{-5}	0.50176	0.73	0.50175702
0.90	1.55926963×10^{-5}	0.71766	0.8575	0.71765818
0.95	1.42350654×10^{-5}	0.84970375	0.926875	0.84970274
1	1.30498594×10^{-5}	**1**	**1**	**1**

B) At Aphelion, we obtain the following numerical results

Table 11. The numerical results of the planetary parameters are given by: the rest planet mass, m (Kg), the distance from the planet to the sun at **Alphelion**, $r_P(m)$, and the planet speed at **Alphelion**, average values, $v_{P,Aver.}$, and corresponding Newton ones, $v_{P,NL}$, being obtained by a 3rd Newton Law. Further, the sun mass M, universal gravitational constant G, and light speed c, are found to be given respectively by : $M = 1.988475 \times 10^{30}$ kg, $G = 6.6743 \times 10^{-11}\ \frac{m^3}{kg\times s^2}$, and $c = 2.9979 \times 10^8\ (\frac{m}{s})$. It should be noted that, for the Moon-Sun interaction system, the value of $v_{P,Aver.} = 1.03\ \left(\frac{10^3\times m}{s}\right)$, given in literature, is completely wrong !!!

Celestial body	m (Kg)	$r_P(m)$	$v_{P,Aver.}\left(\frac{10^3\times m}{s}\right)$	$v_{P,NL}\left(\frac{10^3\times m}{s}\right)$
Mercury	3.30101×10^{23}	6.98173×10^{10}	47.87	43.5995
Venus	4.86732×10^{24}	1.08940×10^{11}	35.02	34.9035
Earth	5.97219×10^{24}	1.52096×10^{11}	29.78	29.5396
Mars	6.41693×10^{23}	2.49233×10^{11}	24.13	23.0760
Jupiter	1.89852×10^{27}	8.16038×10^{11}	13.06	12.7529
Saturn	5.68460×10^{26}	1.50724×10^{12}	9.64	9.3836
Uranus	8.68192×10^{25}	3.01104×10^{12}	6.79	6.6390
Neptune	1.02431×10^{26}	4.54594×10^{12}	5.43	5.4032
Pluto	1.46158×10^{22}	7.38868×10^{12}	4.74	4.2382
Moon	7.34581×10^{22}	4.04689×10^{8}	1.03	572.6671

Table 12. In the **Mercury-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in Table 11, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$
Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 2.22506339 \times 10^{40}$ J, $U_o(p) = -1.25498821 \times 10^{33}$ J and $E_o(p) = 2.22506326 \times 10^{40}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 5.64023577×10^{-8}.				
0.00014543	**1.99999906**	**1.41005963×10^{-8}**	**0.50000001**	**$-1.41005839\times 10^{-8}$**
0.09	5.24350608×10^{-6}	0.00542187	0.50405	0.00542184
0.30	4.90259727×10^{-7}	0.0627	0.545	0.06269997
0.40	2.83970203×10^{-7}	0.1152.	0.58	0.11519997
0.60	1.3542939×10^{-7}	0.2832	0.68	0.28319998
0.80	8.21199099×10^{-8}	0.5632	0.82	0.56319999
0.90	6.72784152×10^{-8}	0.7587	0.905	0.75869999
0.95	6.14460178×10^{-8}	0.87316875	0.95125	0.87316875
1	5.64023577×10^{-8}	**1**	**1**	**1**
Here, for **p=2** and at v=c, **$K_o(p) = mc^2 = 2.966751183 \times 10^{40}$ J, in good agreement with that, proposed by Einstein in 1905**, $U_o(p) = -1.88248231 \times 10^{33}$ J and $E_o(p) = 2.96675099 \times 10^{40}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 6.34526522×10^{-8}.				
0.00014543	**1.999999908**	**1.05754473×10^{-8}**	**0.33333335**	**$-1.05754383\times 10^{-9}$**
0.09	5.26440239×10^{-6}	0.00408281	0.33873333	0.00408278
0.30	5.08828608×10^{-7}	0.04905	0.39333333	0.04904998
0.40	3.00853092×10^{-7}	0.0928	0.44	0.09279998
0.60	1.48609153×10^{-7}	0.2448	0.57333333	0.24479998
0.80	9.18902738×10^{-8}	0.5248	0.76	0.52479999
0.90	7.55955478×10^{-8}	0.73305	0.87333333	0.73304999
0.95	6.91065974×10^{-8}	0.85850312	0.935	0.85850312
1	6.34526522×10^{-8}	**1**	**1**	**1**
Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 3.70843898 \times 10^{40}$ J,$U_o(p) = -2.50997641 \times 10^{33}$ J and $E_o(p) = 3.70843873 \times 10^{40}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 6.7682829×10^{-8}.				
0.00014543	**1.9999991**	**8.46035796×10^{-9}**	**0.25000002**	**$-8.46035796\times 10^{-9}$**
0.09	5.28513147×10^{-6}	0.00327937	0.256075	0.00327935
0.30	5.25925067×10^{-7}	0.04086	0.3175	0.04085998
0.40	3.15557545×10^{-7}	0.07936	0.37	0.07935998
0.60	1.58707933×10^{-7}	0.22176	0.52	0.22175998

0.80	9.84703149×10^{-8}	0.50176	0.73	0.50175998
0.90	8.08712007×10^{-8}	0.71766	0.8575	0.71765999
0.95	7.38298757×10^{-8}	0.84970375	0.926875	0.84970374
1	6.7682829×10^{-8}	**1**	**1**	**1**

Table 13. In the **Venus-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in Table 11, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$
Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 3.28084299 \times 10^{41}$ J, $U_o(p) = -1.18592816 \times 10^{34}$ J and $E_o(p) = 3.28084287 \times 10^{41}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 3.61470563×10^{-8}.				
0.00011643	**2.00000246**	**9.0367531×10^{-9}**	**0.50000001**	**$-9.03677563\times 10^{-9}$**
0.09	3.36045013×10^{-6}	0.00542187	0.50405	0.00542185
0.30	3.14196901×10^{-7}	0.0627	0.545	0.06269998
0.40	1.81990388×10^{-7}	0.1152	0.58	0.11519998
0.60	8.67937794×10^{-8}	0.2832	0.68	0.28319999
0.80	5.26288817×10^{-8}	0.5632	0.82	0.56319999
0.90	4.31172874×10^{-8}	0.7587	0.905	0.75869999
0.95	3.93794296×10^{-8}	0.87316875	0.95125	0.87316875
1	3.61470563×10^{-8}	**1**	**1**	**1**
Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 4.37445732 \times 10^{41}}$ **J, in good agreement with that, proposed by Einstein in 1905**, $U_o(p) = -1.77889225 \times 10^{34}$ J and $E_o(p) = 4.3744571454 \times 10^{41}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 4.06654384×10^{-8}.				
0.00011643	**2.00000247**	**6.77756487×10^{-9}**	**0.33333334**	**$-6.77756487\times 10^{-9}$**
0.09	3.37384212×10^{-6}	0.00408280	0.33873333	0.00408279
0.30	3.26097297×10^{-7}	0.04905	0.39333333	0.04904999
0.40	1.92810268×10^{-7}	0.0928	0.44	0.09279999
0.60	9.52404057×10^{-8}	0.2448	0.57333333	0.24479999
0.80	5.88904977×10^{-8}	0.5248	0.76	0.52479999
0.90	4.84475586×10^{-8}	0.73305	0.87333333	0.73304999
0.95	4.42889301×10^{-8}	0.85850312	0.935	0.85850312
1	4.06654384×10^{-8}	**1**	**1**	**1**
Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 5.46807165 \times 10^{41}$ J,$U_o(p) = -2.37185633 \times 10^{34}$ J and $E_o(p) = 5.46807142 \times 10^{41}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 4.33764676×10^{-8}.				

0.00011643	**2.00000248**	**5.42205194×10^{-9}**	**0.25000001**	**$-5.42206564\times 10^{-9}$**
0.09	3.38712695×10^{-6}	0.00327937	0.256075	0.00327936
0.30	3.37054049×10^{-7}	0.04086	0.3175	0.04085999
0.40	2.02234035×10^{-7}	0.07936	0.37	0.07935999
0.60	1.01712496×10^{-7}	0.22176	0.52	0.22175999
0.80	6.31075043×10^{-8}	0.50176	0.73	0.50175999
0.90	5.1828611×10^{-8}	0.71766	0.8575	0.71765999
0.95	4.73159774×10^{-8}	0.84970375	0.926875	0.84970375
1	4.33764676×10^{-8}	**1**	**1**	**1**

Table 14. In the **Earth-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in Table 11, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$

Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 4.02558651 \times 10^{41}$ J, $U_o(p) = -1.04224946 \times 10^{34}$ J and $E_o(p) = 4.0255864 \times 10^{41}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 2.58906238×10^{-8}.

9.8534×10^{-5}	**1.99999469**	**6.47267318×10^{-9}**	**0.50**	**$-6.47263901\times 10^{-9}$**
0.09	2.4069498×10^{-6}	0.00542187	0.50405	0.00542186
0.30	2.25046092×10^{-7}	0.0627	0.545	0.06269999
0.40	1.30352099×10^{-7}	0.1152	0.58	0.11519999
0.60	6.21667521×10^{-8}	0.2832	0.68	0.28319999
0.80	3.76958657×10^{-8}	0.5632	0.82	0.56319999
0.90	3.08831086×10^{-8}	0.7587	0.905	0.7587
0.95	2.82058374×10^{-8}	0.87316875	0.95125	0.87316875
1	2.58906238×10^{-8}	**1**	**1**	**1**

Here, for **p=2** and at v=c, **$K_o(p) = mc^2 = 5.36744867 \times 10^{41}$ J, in good agreement with that, proposed by Einstein in 1905**, $U_o(p) = -1.56337419 \times 10^{34}$ J and $E_o(p) = 5.36744852 \times 10^{41}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 2.91269519×10^{-8}.

9.8534×10^{-5}	**1.9999947**	**4.85450491×10^{-9}**	**0.33333334**	**$-4.85447934\times 10^{-9}$**
0.09	2.41654193×10^{-6}	0.00408281	0.33873333	0.0040828
0.30	2.33569848×10^{-7}	0.04905	0.39333333	0.04904999
0.40	1.38101927×10^{-7}	0.0928	0.44	0.09279999
0.60	6.82167172×10^{-8}	0.2448	0.57333333	0.24479999
0.80	4.21807991×10^{-8}	0.5248	0.76	0.52479999
0.90	3.47009589×10^{-8}	0.73305	0.87333333	0.73305
0.95	3.17223072×10^{-8}	0.85850312	0.935	0.85850312

1	2.91269519×10^{-8}	**1**	**1**	**1**

Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4}\times mc^2 = 6.70931084\times 10^{41}$ J, $U_o(p) = -2.08449892\times 10^{34}$ J and $E_o(p) = 6.70931063\times 10^{41}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 3.10687486×10^{-8}.

$\mathbf{9.8534\times 10^{-5}}$ **1.99999471**		**3.88360395**$\times 10^{-9}$	**0.25000001**	**-3.88358354**$\times 10^{-9}$
0.09	2.42605729×10^{-6}	0.00327937	0.256075	0.00327936
0.30	2.41417711×10^{-7}	0.04086	0.3175	0.04085999
0.40	1.44851776×10^{-7}	0.07936	0.37	0.07935999
0.60	7.28524046×10^{-8}	0.22176	0.52	0.22175999
0.80	4.52012645×10^{-8}	0.50176	0.73	0.50175999
0.90	3.71226653×10^{-8}	0.71766	0.8575	0.71766
0.95	3.38904546×10^{-8}	0.84970375	0.926875	0.84970375
1	3.10687486×10^{-8}	**1**	**1**	**1**

Table 15. In the **Mars-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in Table 11, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \le v \le c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$

Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right)\times mc^2 = 4.32536587\times 10^{40}$ J, $U_o(p) = -6.83404149\times 10^{32}$ J and $E_o(p) = 4.32536580\times 10^{40}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.57999155×10^{-8}.

$\mathbf{8.0490\times 10^{-5}}$ **1.99999657**		**3.94998566**$\times 10^{-9}$	**0.50**	**-3.94997216**$\times 10^{-9}$
0.09	1.4688562×10^{-6}	0.00542187	0.50405	0.00542186
0.30	1.37335788×10^{-7}	0.0627	0.545	0.06269999
0.40	7.95481853×10^{-8}	0.1152	0.58	0.11519999
0.60	3.79376499×10^{-8}	0.2832	0.68	0.28319999
0.80	2.30041383×10^{-8}	0.5632	0.82	0.5632
0.90	1.88466105×10^{-8}	0.7587	0.905	0.7587
0.95	1.72127891×10^{-8}	0.87316875	0.95125	0.87316875
1	1.57999155×10^{-8}	**1**	**1**	**1**

Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 5.7671545\times 10^{40}}$ **J, in good agreement with that, proposed by Einstein in 1905**, $U_o(p) = -1.02510622\times 10^{33}$ J and $E_o(p) = 5.7671544\times 10^{40}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.77749048×10^{-8}.

$\mathbf{8.0490\times 10^{-5}}$ **1.99999657**		**2.96248925**$\times 10^{-9}$	**0.33333334**	**-2.96247915**$\times 10^{-9}$
0.09	1.47470985×10^{-6}	0.00408281	0.33873333	0.0040828
0.30	1.42537463×10^{-7}	0.04905	0.39333333	0.04904999

0.40	8.42775660×10^{-8}	0.0928	0.44	0.09279999
0.60	4.1629679×10^{-8}	0.2448	0.57333333	0.24479999
0.80	2.57410969×10^{-8}	0.5248	0.76	0.5248
0.90	2.11764776×10^{-8}	0.73305	0.87333333	0.73305
0.95	1.93587368×10^{-8}	0.85850312	0.935	0.85850312
1	1.77749048×10^{-8}	**1**	**1**	**1**

Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4}\times mc^2 = 7.20894312\times 10^{40}$ J, $U_o(p) = -1.3668083\times 10^{33}$ J and $E_o(p) = 7.20894298\times 10^{40}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.89598985×10^{-8}.

8.0490×10^{-5}	**1.8290925**	**2.59143521×10^{-9}**	**0.25**	**$-2.14853955\times 10^{-9}$**
0.09	1.48051666×10^{-6}	0.00327937	0.256075	0.00327936
0.30	1.47326671×10^{-7}	0.04086	0.3175	0.04085999
0.40	8.83967041×10^{-8}	0.07936	0.37	0.07935999
0.60	4.44586364×10^{-8}	0.22176	0.52	0.22175999
0.80	2.75843549×10^{-8}	0.50176	0.73	0.50176
0.90	2.26543391×10^{-8}	0.71766	0.8575	0.71766
0.95	2.06818623×10^{-8}	0.84970375	0.926875	0.84970375
1	1.89598985×10^{-8}	**1**	**1**	**1**

Table 16. In the **Jupiter-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in Table 11, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \le v \le c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$

Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right)\times mc^2 = 1.27970753\times 10^{44}$ J, $U_o(p) = -6.17533679\times 10^{35}$ J and $E_o(p) = 1.27970752\times 10^{44}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 4.82558449×10^{-9}.

4.2539×10^{-5}	**1.9999888**	**1.20640288×10^{-9}**	**0.50**	**$-1.20638938\times 10^{-9}$**
0.09	4.48615674×10^{-7}	0.00542187	0.50405	0.00542187
0.30	4.19448732×10^{-8}	0.0627	0.545	0.0627
0.40	2.42954775×10^{-8}	0.1152	0.58	0.1152
0.60	1.15868555×10^{-8}	0.2832	0.68	0.2832
0.80	7.02588654×10^{-9}	0.5632	0.82	0.5632
0.90	5.75610104×10^{-9}	0.7587	0.905	0.7587
0.95	5.25710209×10^{-9}	0.87316875	0.95125	0.87316875
1	4.82558449×10^{-9}	**1**	**1**	**1**

Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 1.7062767 \times 10^{44}}$ **J**, in good agreement with that, proposed by **Einstein in 1905**, $U_o(p) = -9.26300519 \times 10^{35}$ J and $E_o(p) = 1.70627669 \times 10^{44}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 5.42878253×10^{-9}.

4.2539×10^{-5}	**1.9999888**	**$9.04802161\times 10^{-10}$**	**0.33333333**	**$-9.04792034\times 10^{-9}$**
0.09	4.50403487×10^{-7}	0.0040828	0.33873333	0.0040828
0.30	4.35335604×10^{-8}	0.04905	0.39333333	0.04905
0.40	2.57399173×10^{-8}	0.0928	0.44	0.0928
0.60	1.27144689×10^{-8}	0.2448	0.57333333	0.2448
0.80	7.86180399×10^{-9}	0.5248	0.76	0.5248
0.90	6.46768539×10^{-9}	0.73305	0.87333333	0.73305
0.95	5.91251392×10^{-9}	0.85850312	0.935	0.85850312
1	5.42878253×10^{-9}	**1**	**1**	**1**

Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 2.13284588 \times 10^{44}$ J, $U_o(p) = -1.23506736 \times 10^{36}$ J and $E_o(p) = 2.13284586 \times 10^{44}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 5.79070136×10^{-9}.

4.2539×10^{-5}	**1.907037**	**$7.59122846\times 10^{-10}$**	**0.25**	**$-6.88552513\times 10^{-10}$**
0.09	4.52176993×10^{-7}	0.00327937	0.256075	0.00327936
0.30	4.49962725×10^{-8}	0.04086	0.3175	0.04086
0.40	2.69979777×10^{-8}	0.07936	0.37	0.07936
0.60	1.35784844×10^{-8}	0.22176	0.52	0.22176
0.80	8.42476888×10^{-9}	0.50176	0.73	0.50176
0.90	6.91905144×10^{-9}	0.71766	0.8575	0.71766
0.95	6.31662078×10^{-9}	0.84970375	0.926875	0.84970375
1	5.79070136×10^{-9}	**1**	**1**	**1**

Table 17. In the **Saturn-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in Table 11, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$
Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 3.83173493 \times 10^{43}$ J, $U_o(p) = -1.00109053 \times 10^{35}$ J and $E_o(p) = 3.83173492 \times 10^{43}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 2.61262989×10^{-9}.				
3.1301×10^{-5}	**2.00002061**	**6.5315075×10^{-10}**	**0.50**	**$-6.53164212\times 10^{-10}$**
0.09	2.42885962×10^{-7}	0.00542187	0.50405	0.00542187
0.30	2.27094625×10^{-8}	0.0627	0.545	0.0627
0.40	1.31538659×10^{-8}	0.1152	0.58	0.1152
0.60	6.27326391×10^{-9}	0.2832	0.68	0.2832

0.80	3.80390008×10^{-9}	0.5632	0.82	0.5632
0.90	3.1164229×10^{-9}	0.7587	0.905	0.7587
0.95	2.84625867×10^{-9}	0.87316875	0.95125	0.87316875
1	2.61262989×10^{-9}	**1**	**1**	**1**

Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 5.10897991 \times 10^{43}}$ **J**, in good agreement with that, proposed by **Einstein in 1905**, $U_o(p) = -1.5016358 \times 10^{35}$ J and $E_o(p) = 5.10897989 \times 10^{43}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 2.93920877×10^{-9}.

$\mathbf{3.1301 \times 10^{-5}}$ **2.00002061**		**4.89863063**$\times 10^{-10}$	**0.33333333**	**-4.8987316**$\times 10^{-10}$
0.09	2.43853906×10^{-7}	0.00408281	0.33873333	0.0040828
0.30	2.35695971×10^{-8}	0.04905	0.39333333	0.04905
0.40	1.39359031×10^{-8}	0.0928	0.44	0.0928
0.60	6.88376756×10^{-8}	0.2448	0.57333333	0.2448
0.80	4.25647595×10^{-9}	0.5248	0.76	0.5248
0.90	3.50168328×10^{-9}	0.73305	0.87333333	0.73305
0.95	3.2011066×10^{-9}	0.85850312	0.935	0.85850312
1	2.93920877×10^{-9}	**1**	**1**	**1**

Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 6.38622489 \times 10^{43}$ J,$U_o(p) = -2.00218106 \times 10^{35}$ J and $E_o(p) = 6.38622487 \times 10^{43}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 3.13515580×10^{-9}.

$\mathbf{3.1301 \times 10^{-5}}$ **2.00002061**		**3.91890451**$\times 10^{-10}$	**0.25**	**-3.91898528**$\times 10^{-10}$
0.09	2.44814103×10^{-7}	0.00327937	0.256075	0.00327937
0.30	2.43615271×10^{-8}	0.04086	0.3175	0.04086
0.40	1.46170324×10^{-8}	0.07936	0.37	0.07936
0.60	7.35155614×10^{-9}	0.22176	0.52	0.22176
0.80	4.56127192×10^{-9}	0.50176	0.73	0.50176
0.90	3.74605824×10^{-9}	0.71766	0.8575	0.71766
0.95	3.41989503×10^{-9}	0.84970375	0.926875	0.84970375
1	3.13515580×10^{-9}	**1**	**1**	**1**

Table 18. In the **Uranus-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in Table 11, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$

Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 5.85209446 \times 10^{42}$ J, $U_o(p) = -7.65341229 \times 10^{33}$ J and $E_o(p) = 5.85209445 \times 10^{42}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.30780731×10^{-9}.

2.2145×10^{-5}	**2.00001841**	**$3.26948835\times 10^{-10}$**	**0.50**	**-$3.26954853\times 10^{-10}$**
0.09	1.21581725×10^{-7}	0.00542187	0.50405	0.00542187
0.30	1.13677036×10^{-8}	0.0627	0.545	0.0627
0.40	6.58444688×10^{-9}	0.1152	0.58	0.1152
0.60	3.14021542×10^{-9}	0.2832	0.68	0.2832
0.80	1.90412297×10^{-9}	0.5632	0.82	0.5632
0.90	1.55999169×10^{-9}	0.7587	0.905	0.7587
0.95	1.42475531×10^{-9}	0.87316875	0.95125	0.87316875
1	1.30780731×10^{-9}	**1**	**1**	**1**

Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 7.80279261 \times 10^{42}}$ **J**, in good agreement with that, proposed by **Einstein in 1905**, $U_o(p) = -1.14801184 \times 10^{34}$ J and $E_o(p) = 7.80279260 \times 10^{42}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.47128332×10^{-9}.

2.2145×10^{-5}	**2.00001841**	**$2.45211626\times 10^{-10}$**	**0.33333333**	**-2.4521614×10^{-10}**
0.09	1.2206625×10^{-7}	0.00408281	0.33873333	0.0040828
0.30	1.17982623×10^{-8}	0.04905	0.39333333	0.04905
0.40	6.97591229×10^{-9}	0.0928	0.44	0.0928
0.60	3.44581608×10^{-9}	0.2448	0.57333333	0.2448
0.80	2.13066942×10^{-9}	0.5248	0.76	0.5248
0.90	1.75284187×10^{-9}	0.73305	0.87333333	0.73305
0.95	1.60238189×10^{-9}	0.85850312	0.935	0.85850312
1	1.47128332×10^{-9}	**1**	**1**	**1**

Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 9.75349076 \times 10^{42}$ J,$U_o(p) = -1.53068246 \times 10^{34}$ J and $E_o(p) = 9.75349075 \times 10^{42}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.56936875×10^{-9}.

2.2145×10^{-5}	**2.00001841**	**$1.96169301\times 10^{-10}$**	**0.25**	**-$1.96172912\times 10^{-10}$**
0.09	1.22546897×10^{-7}	0.00327937	0.256075	0.00327937
0.30	1.21946795×10^{-8}	0.04086	0.3175	0.04086
0.40	7.31686589×10^{-8}	0.07936	0.37	0.07936
0.60	3.67997743×10^{-9}	0.22176	0.52	0.22176
0.80	2.28324148×10^{-9}	0.50176	0.73	0.50176
0.90	1.87516902×10^{-9}	0.71766	0.8575	0.71766
0.95	1.71190107×10^{-9}	0.84970375	0.926875	0.84970375
1	1.56936875×10^{-9}	**1**	**1**	**1**

Table 19. In the **Neptune-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in Table 11, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$
Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 6.90441616 \times 10^{42}$ J, $U_o(p) = -5.98085905 \times 10^{33}$ J and $E_o(p) = 6.90441615 \times 10^{42}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of $8.66236638\times 10^{-10}$.				
1.8023×10^{-5}	**2.00000034**	**$2.16559153\times 10^{-10}$**	**0.50**	**$-2.16559226\times 10^{-10}$**
0.09	8.05306355×10^{-8}	0.00542187	0.50405	0.00542187
0.30	7.52949003×10^{-9}	0.0627	0.545	0.0627
0.40	4.36126157×10^{-9}	0.1152	0.58	0.1152
0.60	2.0799471×10^{-9}	0.2832	0.68	0.2832
0.80	1.26121114×10^{-9}	0.5632	0.82	0.5632
0.90	1.03327302×10^{-9}	0.7587	0.905	0.7587
0.95	$9.43698231\times 10^{-10}$	0.87316875	0.95125	0.87316875
1	$8.66236638\times 10^{-10}$	**1**	**1**	**1**
Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 9.20588821 \times 10^{42}}$ **J**, in good agreement with that, proposed by **Einstein in 1905**, $U_o(p) = -8.97128858 \times 10^{33}$ J and $E_o(p) = 9.20588820 \times 10^{42}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of $9.74516357\times 10^{-10}$.				
1.8023×10^{-5}	**2.00000034**	**$1.62419365\times 10^{-10}$**	**0.33333333**	**$-1.62419419\times 10^{-10}$**
0.09	8.08515644×10^{-8}	0.00408281	0.33873333	0.0040828
0.30	7.81467413×10^{-9}	0.04905	0.39333333	0.04905
0.40	4.62055161×10^{-9}	0.0928	0.44	0.0928
0.60	2.28236396×10^{-9}	0.2448	0.57333333	0.2448
0.80	1.4112661×10^{-9}	0.5248	0.76	0.5248
0.90	1.16100884×10^{-9}	0.73305	0.87333333	0.73305
0.95	1.06135067×10^{-9}	0.85850312	0.935	0.85850312
1	$9.74516357\times 10^{-10}$	**1**	**1**	**1**
Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 1.150736026 \times 10^{43}$ J, $U_o(p) = -1.19617181 \times 10^{34}$ J and $E_o(p) = 1.150736025 \times 10^{43}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.03948405×10^{-9}.				
1.8023×10^{-5}	**2.00000034**	**$1.29935492\times 10^{-10}$**	**0.25**	**$-1.29935535\times 10^{-10}$**
0.09	8.11699251×10^{-8}	0.00327937	0.256075	0.00327937
0.30	8.07724443×10^{-9}	0.04086	0.3175	0.04086

0.40	4.84638507×10^{-9}	0.07936	0.37	0.07936
0.60	2.43746279×10^{-9}	0.22176	0.52	0.22176
0.80	1.51232338×10^{-9}	0.50176	0.73	0.50176
0.90	1.24203337×10^{-9}	0.71766	0.8575	0.71766
0.95	1.13389143×10^{-9}	0.84970375	0.926875	0.84970375
1	1.03948405×10^{-9}	**1**	**1**	**1**

Table 20. In the **Pluto-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in Table 11, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$
Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 9.851857903 \times 10^{38}$ J, $U_o(p) = -5.25063209 \times 10^{29}$ J and $E_o(p) = 9.8518578979 \times 10^{38}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of $5.32958566\times 10^{-10}$.				
1.4137×10^{-5}	**1.99998207**	**$1.33240837\times 10^{-10}$**	**0.50**	**$-1.33238448\times 10^{-10}$**
0.09	4.95470689×10^{-8}	0.00542187	0.50405	0.00542187
0.30	4.63257444×10^{-9}	0.0627	0.545	0.0627
0.40	2.68329836×10^{-9}	0.1152	0.58	0.1152
0.60	1.27970279×10^{-9}	0.2832	0.68	0.2832
0.80	$7.75969511\times 10^{-10}$	0.5632	0.82	0.5632
0.90	$6.35728914\times 10^{-10}$	0.7587	0.905	0.7587
0.95	$5.80617221\times 10^{-10}$	0.87316875	0.95125	0.87316875
1	$5.32958566\times 10^{-10}$	**1**	**1**	**1**
Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 1.313581054 \times 10^{39}}$ **J**, in good agreement with that, proposed by **Einstein in 1905**, $U_o(p) = -7.87594813 \times 10^{29}$ J and $E_o(p) = 1.313581053 \times 10^{39}$ J , suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of $5.99578387\times 10^{-10}$.				
1.4137×10^{-5}	**1.99998207**	**$9.99306275\times 10^{-11}$**	**0.33333333**	**$-9.99288359\times 10^{-11}$**
0.09	4.97445228×10^{-8}	0.00408281	0.33873333	0.0040828
0.30	4.80803597×10^{-9}	0.04905	0.39333333	0.04905
0.40	2.84282864×10^{-9}	0.0928	0.44	0.0928
0.60	1.40424128×10^{-9}	0.2448	0.57333333	0.2448
0.80	$8.68291994\times 10^{-10}$	0.5248	0.76	0.5248
0.90	$7.14319381\times 10^{-10}$	0.73305	0.87333333	0.73305
0.95	$6.53003762\times 10^{-10}$	0.85850312	0.935	0.85850312
1	$5.99578387\times 10^{-10}$	**1**	**1**	**1**
Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 1.641976317 \times 10^{39}$ J , $U_o(p) = -1.05012642 \times 10^{30}$ J and $E_o(p) = 1.6419763161 \times 10^{39}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of $6.39550302\times 10^{-10}$.				

1.4137×10^{-5}	**1.99998207**	**7.9944502$\times 10^{-11}$**	**0.25**	**-7.99430687$\times 10^{-11}$**
0.09	4.99403965$\times 10^{-8}$	0.00327937	0.256075	0.00327937
0.30	4.9695843$\times 10^{-9}$	0.04086	0.3175	0.04086
0.40	2.98177427$\times 10^{-9}$	0.07936	0.37	0.07936
0.60	1.49966695$\times 10^{-9}$	0.22176	0.52	0.22176
0.80	9.30468147$\times 10^{-10}$	0.50176	0.73	0.50176
0.90	7.64170172$\times 10^{-10}$	0.71766	0.8575	0.71766
0.95	6.97635061$\times 10^{-10}$	0.84970375	0.926875	0.84970375
1	6.39550302$\times 10^{-10}$	**1**	**1**	**1**

Table 21. In the **Moon-Sun interaction system**, in which the values of m, r_P and $v_{P,NL}$ are given in Table 11, the numerical results of $RE(v;p)$, $K^*(v;p)/K_o(p)$, $U^*(v;p)/U_o(p)$ and $E^*(v;p)/E_o(p)$, are obtained by using Equations (7, 4, 5, 6), respectively, noting that $v_{P,NL} \leq v \leq c$.

X(v)=v/c	$RE(v;p)$	$K^*(v;p)/K_o(p)$	$U^*(v;p)/U_o(p)$	$E^*(v;p)/E_o(p)$
Here, for **p=1** and at v=c, $K_o(p) = \left(\frac{3}{4}\right) \times mc^2 = 4.951482389 \times 10^{39}$ J, $U_o(p) = -4.81808154 \times 10^{34}$ J and $E_o(p) = 4.9514342084 \times 10^{39}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 9.73058402$\times 10^{-6}$.				
0.00191023	**2.00000361**	**2.43265049$\times 10^{-6}$**	**0.50**	**-2.43268295$\times 10^{-6}$**
0.09	0.00090461	0.00542187	0.50405	0.00541702
0.30	8.45800366$\times 10^{-5}$	0.0627	0.545	0.06269531
0.40	4.89907876$\times 10^{-5}$	0.1152	0.58	0.11519548
0.60	2.33643967$\times 10^{-5}$	0.2832	0.68	0.28319614
0.80	1.41673986$\times 10^{-5}$	0.5632	0.82	0.5631975
0.90	1.1606931$\times 10^{-5}$	0.7587	0.905	0.75869858
0.95	1.06007007$\times 10^{-5}$	0.87316875	0.95125	0.87316799
1	9.73058402$\times 10^{-6}$	**1**	**1**	**1**
Here, for **p=2** and at v=c, $\mathbf{K_o(p) = mc^2 = 6.601976519 \times 10^{39}}$ **J**, in good agreement with that, proposed by **Einstein in 1905**, $U_o(p) = -7.22712231 \times 10^{34}$ J and $E_o(p) = 6.60190425 \times 10^{39}$ J , suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.0946907$\times 10^{-5}$.				
0.00191023	**2.00000726**	**1.82449119$\times 10^{-6}$**	**0.33333333**	**-1.82452442$\times 10^{-6}$**
0.09	0.00090822	0.00408281	0.33873333	0.00407914
0.30	8.77835562$\times 10^{-5}$	0.04905	0.39333333	0.04904623
0.40	5.19034385$\times 10^{-5}$	0.0928	0.44	0.0927962
0.60	2.56381809$\times 10^{-5}$	0.2448	0.57333333	0.2447964
0.80	1.58529904$\times 10^{-5}$	0.5248	0.76	0.52479743
0.90	1.304181$\times 10^{-5}$	0.73305	0.87333333	0.73304846

0.95	1.19223306×10^{-5}	0.85850312	0.935	0.85850229
1	1.0946907×10^{-5}	**1**	**1**	**1**

Here, for **p=3** and further at v=c, $K_o(p) = \frac{5}{4} \times mc^2 = 8.25247065 \times 10^{39}$ J,$U_o(p) = -9.63616308 \times 10^{34}$ J and $E_o(p) = 8.25237429 \times 10^{39}$ J, suggesting that $E_o(p) \cong K_o(p)$, with a precision of the order of 1.16767008×10^{-5}. NY

0.00191023	**2.00001091**	**1.45959562×10^{-6}**	**0.25**	**$-1.45962859\times 10^{-6}$**
0.09	0.0009118	0.00327937	0.256075	0.00327641
0.30	9.07330522×10^{-5}	0.04086	0.3175	0.04085677
0.40	5.44402634×10^{-5}	0.07936	0.37	0.07935661
0.60	2.73804312×10^{-5}	0.22176	0.52	0.22175652
0.80	1.69881848×10^{-5}	0.50176	0.73	0.50175733
0.90	1.39519702×10^{-5}	0.71766	0.8575	0.71765837
0.95	1.27371947×10^{-5}	0.84970375	0.926875	0.84970285
1	1.16767008×10^{-5}	**1**	**1**	**1**