Correction to

Energy Circulation Theory to Derive a Cosmic Evolution, Electric Charge, Light and Electromagnetism

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As for "***Intra-circulation force***" there was a mistake in formulas. Between two local energy parts apart by a central angle θ of an energy circulation, the following force works.

$$F = -K_f \frac{\Delta p_0 \Delta p_\theta}{4\mu^2} = -K_f \frac{\Delta E_0 \Delta E_\theta}{4 v_c{}^2 \mu^2} \tag{3.3}$$

The sum of local momentum Δp for one cycle $0 \sim 2\pi$ is equal to the total circulating momentum p.

$$\int_0^{2\pi} \Delta p d\theta = p \quad , \quad 2\pi \Delta p = p$$

However, in the published paper, Δp was wrongly treated as $\Delta p = p$ for integration by θ. We amend equations including intra-circulation force to be as marked yellow as follows.

"We get the centripetal and the tangential components of the sum of the forces with the whole circumference for a part as follows."

$$cF_\perp = -K_f \frac{\Delta p_0}{4\mu^2} \int_0^{2\pi} \Delta p_\theta \sin\frac{\theta}{2} d\theta = -K_f \frac{\Delta p}{4\mu^2} \frac{p}{2\pi} 4 = -K_f \frac{p\Delta p}{2\pi\mu^2} = -K_f \frac{E\Delta E}{2\pi v_c{}^2 \mu^2} \tag{3.4}$$

$$cF_{//} = -K_f \frac{\Delta p_0}{4\mu^2} \int_0^{2\pi} \Delta p_\theta \cos\frac{\theta}{2} d\theta = -K_f \frac{\Delta p}{4\mu^2} \frac{p}{2\pi} \int_0^{2\pi} \cos\frac{\theta}{2} d\theta = 0 \tag{3.5}$$

"Take a case that multiple localized intrinsic energies (massive substances) are circulating at V_c on the circumference of a radius r. Let E_0 be the intrinsic energy of a piece and Σ_0 be the sum of the whole intrinsic energies. The piece has the momentum $P_c = E_0 V_c$ and the total energy $E_t = E_0 V_c{}^2$. The piece receives the following centripetal force by the intra-circulation interaction with the whole circulation based on the momentum."

$$F = -K_f V_c{}^2 \frac{E_0 \Sigma_0}{2\pi r^2} \tag{3.11}$$

The centripetal force that a minute area energy ΔE receives from the whole energy E_U of the circulation (universe) is given as follows from eq. (3.4), where $v_c = x\omega$.

$$F = -K_f \frac{E_U \Delta E}{2\pi v_c{}^2 x^2} \tag{4.17}$$

"From the conservation of the sum of the potential and the kinetic energies, we get the expansion speed of the radius as follows."

$$E_p(x) - E_p(x_0) + E_k(x) = E_k(x_0)$$

$$E_k(x_0)=\int_{x_0}^{x} K_f \frac{E_U E(x_0)}{2\pi v_o{}^2 x^2}dx + E_k(x) = K_f \frac{E_U E(x_0)}{2\pi v_o{}^2}\left(\frac{1}{x_0}-\frac{1}{x}\right)+E_k(x) \tag{4.18}$$

$$E(x_0)=mv_c{}^2=mv_0{}^2,\quad E_k(x_0)=\frac{1}{2}mv_0{}^2,\quad E_k(x)=\frac{1}{2}mv^2 \tag{4.19}$$

$$v_0{}^2=\frac{K_f E_U}{\pi}\left(\frac{1}{x_0}-\frac{1}{x}\right)+v^2$$

x_0, v_0 : initial values, m : mass (intrinsic energy)

$$v^2=\frac{K_f E_U}{\pi}\left(\frac{1}{x}-K\right),\quad K\equiv\frac{1}{x_0}-\frac{\pi v_0{}^2}{K_f E_U} \tag{4.20}$$

$$v=\frac{dx}{d\tau}=\pm\sqrt{\frac{K_f E_U}{\pi}\left(\frac{1}{x}-K\right)} \tag{4.21}$$

If we use the "***Cosmic Unit***" for x as one for the maximum radius of the universe, the space expansion speed by τ is zero at $x=1$, that is $K=1$.

$$\frac{dx}{d\tau}=\pm\sqrt{\frac{K_f E_U}{\pi}\left(\frac{1}{x}-1\right)} \tag{4.22}$$

"Let us summarize below the relations between the three kinds of time we introduced so far."

i) Original time τ: $\omega_0\tau$ (phase in lowest-frequency vibration of the initial energy)

ii) Observed Time T: $\dfrac{dT}{d\tau}=\dfrac{dx}{d\tau}=\sqrt{\dfrac{K_f E_U}{\pi}\left(\dfrac{1}{x}-1\right)}\approx K_T$

iii) Clock time t_c: $\dfrac{dt_c}{d\tau}=\dfrac{dt_c}{dT}\dfrac{dT}{d\tau}\approx V_c K_T \quad \left(V_c\equiv\dfrac{dt_c}{dT}\right)$

"The sum of the forces results in a one-directional centripetal force shown below from eq. (3.4)."

$$F=-K_f\frac{(E_\mu/2)\Delta E}{2\pi v_c{}^2\mu_0{}^2}=-\frac{K_f}{2\pi}\frac{E_\mu\Delta E}{2v_c{}^2\mu_0{}^2} \tag{6.1}$$

"The expansion speed of x by the original time τ is given by eq. (4.22) if we use the Cosmic Unit for x as one for the maximum radius of the universe."

$$\frac{dx}{d\tau}=\pm\sqrt{\frac{K_f E_U}{\pi}\left(\frac{1}{x}-1\right)} \tag{4.22}$$

The fundamental force constant K_f and the energy of the whole universe E_U remain constant. From eqs. (7.4) and (4.22) the light speed by the Observed Time becomes

$$C(x)=c(x)\frac{d\tau}{dx}=\frac{K_1}{\sqrt{\frac{K_f E_U}{\pi}x^3\left(\frac{1}{x}-1\right)}} \tag{7.5}$$

$$C(x)=\frac{K}{x\sqrt{1-x}},\quad (\mu_0<x<1,\ K\text{: a constant}). \tag{7.6}$$

There is no change of the final formula Eq. (7.6) for the light speed.