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GLOBAL VAN-CONG EFFECTIVE KINETIC ENERGY, ENHANCED BY NEW EFFECTIVE KINETIC MASS, EXPRESSED AS A FUNCTION OF THE SPEED V, CONFIRMING ITS CORRECT ONE AT LOWEST V, AND ANOTHER ONE, OBTAINED AT THE LIGHT SPEED BY EINSTEIN IN 1905 (33)

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ABSTRACT

In the present work, we present the new expressions of the effective kinetic mass of the particle, $m^*(v)$ and the global effective kinetic energy E^* (v), given respectively in Equations (3, 4), and expressed as functions of the speed v of the particle. Therefore, their limiting results are obtained here, as: at the low speed v (<< c), c and m being respectively the light speed and the rest mass of the particle, given in the non-relativistic case, $m^*(v << c) = m$ and E^* (v<< c)= $\frac{v^2}{2} \times m$, and at v=c, given in the relativistic case, $m^*(v = c) = 2m$, being a new result, and E^* (v=c)=mc^2 in perfect agreement with that obtained by Einstein in 1905.[1,2]

KEYWORDS: Global effective kinetic energy, effective kinetic mass, light speed, relativity, non-relativity.

First of all, one notes that : at low speed v (<< c), c being the light speed, given in the non-relativistic case, the kinetic energy E is defined by:

E(v<< c) $\equiv \frac{v^2}{2} \times m$, m being the rest mass of the particle, and (1) at high speed v(=c), given in the relativistic case, by:

$E(v=c) \equiv \frac{(v=c)^2}{2} \times [m \times (1 + \frac{(v=c)^2}{c^2})]=mc^2$, (2) being obtained by Einstein.[1,2]

Those results suggest us to define our global effective kinetic energy, $E^*(v)$, as:

$E^*(v) \equiv \frac{v^2}{2} \times m^*(v)$,

where the effective kinetic mass, $m^*(v)$, is expressed as a function of v, and proposed here for confirming the above limiting results of E, given in Equations (1, 2),

$m^*(v) = m \times (1 + \frac{v^2}{c^2})$, (3)

being a new result.

It should be concluded here that, as v increases from 0 to c, $m^*(v)$ increases from m to 2m. Therefore, one thus obtains:

$E^*(v) \equiv \frac{v^2}{2} \times [m \times \left(1 + \frac{v^2}{c^2}\right)]$, (4)

according to the well-known limiting results, given in Equations (1, 2), by: E^* (v<< c) $\equiv \frac{v^2}{2} \times m$, and E^* (v=c)=mc^2, obtained by Einstein [1, 2]. Here, $c^2 \cong 9 \times 10^{16}$ (J/Kg) since c=299 792 458 (m/s).

Then, in the following Table 1, the numerical results of the reduced effective kinetic mass $m^*(v)/m$ and the reduced global effective kinetic energy $E^*(v)/mc^2$, expressed as functions of v or the reduced speed, X=v/c, $0 \leq X \leq 1$, are obtained by using Equations (3 and 4).

Table 1: The numerical results of $\frac{m^*(v)}{m} = 1 + X^2$ and $\frac{E^*(v)}{mc^2} = \frac{X^2 \times (1+X^2)}{2}$, expressed as functions of X, are obtained by using Equations (3 and 4).

X	$m^*(v)/m$	$E^*(v)/mc^2$,
0	**1**	**0**
1×10^{-4}	1.00000001	5×10^{-9}
3×10^{-4}	1.00000009	4.5×10^{-8}
6×10^{-4}	1.00000036	1.8×10^{-7}
1×10^{-3}	1.000001	5×10^{-7}
9×10^{-2}	1.0081	0.00408281
0.1	1.01	0.00505
0.13	1.0169	0.00859281
0.16	1.0256	0.01312768
0.19	1.0361	0.01870161

0.25	1.0625	0.03320313
0.30	1.09	0.04905
0.35	1.1225	0.06875312
0.40	1.16	0.0928
0.45	1.2025	0.12175313
0.50	1.25	0.15625
0.55	1.3025	0.19700313
0.60	1.36	0.2448
0.65	1.4225	0.30050313
0.70	1.49	0.36505
0.75	1.5625	0.43945313
0.80	1.64	0.5248
0.85	1.7225	0.62225312
0.90	1.81	0.73305
0.95	1.9025	0.85850312
1	**2**	**1**

Finally, for a give empirical parameter p>0, the general expressions of the effective kinetic mass $m^*(v;p)$ and the global effective kinetic energy $E^*(v;p)$, can be proposed here by:

$m^*(v;p) = m \times (1 + p \times \frac{v^2}{c^2})$, and (5)

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

being identical to those obtained in above Equations (3, 4), for p=1.

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