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DERIVATION OF QUANTITY VELOCITY OF MECHANICAL AND ELECTRICAL PROPERTIES AND ITS RECIPROCITIES

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ABSTRACT: *The dimension velocity of quantities branch with respect to time and dimension which represent the derivative of these quantities due to movements. The dimension velocity of the particle gives a concept of the ordinary velocity and its reciprocal gives another concept to the same motion of particle define as time velocity. The velocities of the mechanical quantities (acceleration, momentum, force, energy, work, power for dimension and time) are resulting from the known laws for kinematics and dynamics movements. The units is introduced by dividing of unit of time. The charge passing through wire define as a charge velocity, while its reciprocal gives another meanings of motion of charge called time current. The energy velocity is defined as the energy (mechanical, electrical, optical, magnetic, thermal) per unit time, and its reciprocally is called the time velocity of energy.*

KEYWORD: Dimension Velocity, Time Velocity, Reciprocal, Mechanical Quantities, Electrical Quantities.

INTRODUCTION

Every kinematics and dynamics quantities for mechanism and electricity due to reciprocities to emphasize the manner of the physical quantity. The concept of the reciprocally physical quantity, gives another meaning, but with the same concept of moving particle or group of particles, for example: the reciprocal of velocity for kinematics (with no inertia) and for dynamics movement give another concept. (Mushfiq, 2009) defined as well slowness υ' as reciprocal of υ ; $\upsilon' = 1/\upsilon = t / x$, therefore, objectivity demands that motion described in terms of slowness that should be as valid as the description in terms of velocities, its postulate in kinematics is symmetry under reciprocal inversion of velocities or the motion is invariant under inversion $\upsilon \rightarrow 1 / \upsilon$ and vice versa [1]. Slowness must form a group, difference between two slowness is slowness, therefore slowness must be discrete[2]. (Md Shah Alam, et al.2005) Applied the mixed numbers algebra(sum of scalar and vector) in quantum mechanics, electrodynamics and special relativity as a complete tools[3].(Mushfiq,2012) have observed a reciprocal relation between Planck's hypothesis and Einstein's postulate (special relativity). Particle velocity and de Broglie wave velocity are also reciprocally related[4].The longitudinal component of the velocity of a particle at or near a glacier surface, its position is a function of time being term its trajectory velocity distribution are studied by (L.A. Rasmussem, 1983)[5].The reciprocal relation give a correspondence between discrete and continuous quantities[4].Movement constitutes a set defined by intrinsic relativity, reciprocity, and simulation of translation and rotation of all moving entities, the soveons. Soveon, elements and subsets, have angular and linear velocities[6].

In pure geometry the theories of similar (reciprocal theorem of Betti and Raleigh) reciprocal and inverse figures (reciprocal diagram) have led to many extensions of science (e.g. the refractive index being proportional to the velocity or the reciprocal of velocity) [7].

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Attenuation coefficient is measured using units of reciprocal length. If the capsular theory was taken, it will use the reciprocal of velocity as a multiplier instead of the velocity itself. For simplicity, the variability of the time t(x) is elapsing between timing events, but the time velocity and reciprocal of velocity are the same[8] The concepts generalize to time - varying and to vector – valued Morse functions [9]. It sometimes uses the reciprocal lattice for crystal structure. It should now be clear that the direct lattice, and its reticular planes, are directly associated (linked) with the reciprocal lattice. (Lima Siow) formulated equivalent principle that the kinetic acceleration is equal to the potential acceleration ($d^2r/ dt^2= - d\Phi/dr$) [10] Lorson explains, in the equation of motion, time is the reciprocal of space and space is the reciprocal of time. This leads to a new concept of motion, which Larson calls scalar motion. Larson's idea that time and space are reciprocals is difficult to understand in the context of the conventional space – time framework as if to say that the march of time is the reciprocal of extension space, which we ordinarily think of as a container of matter. It is much easier to grasp when we considers a theoretical universe of motion in which the only significant physical quantity is the magnitude of that motion, measured as speed or velocity [11].]. The reciprocal of kinematics dimension quantities of moved particle for linear, rotational and circular movement are resulted the quantities that so called the time quantities such as time velocity, time acceleration . Other derivative quantities were derived from the principle equations to produce reciprocal movement equations. For dynamical mechanics, the quantities were derived from the principle equation such as time force, momentum, torque, energy,…ect. Also some reciprocal quantities due to electricity equations include the reactance, electric current, conductivity, …ect.[12]. The equations of the relative time velocity of two moving particles are in the same and opposite direction. The resultant of time velocity of two moving particles travel with right and less right angle ,while the resultant of time velocity in three-components. The relative uniform translational and rotational time velocities are derived from the known dimension velocity equations. The Lorentz- Einstein transformations are converted by the principle formula(reciprocal). In addition to, the classical relative of elapsed time was produced in a different directions of two moving particles, so that the time values was postulate to verify the time of moving one particle or more[13].The aim of the project is evaluated the the dislaced and time velocities of the mechanical and electrical quantities and its reciprocities such as acceleration ,force, linear momentum… ect electric current.

THEORETICAL

Velocity of Mechanical Quantities

1-a) Velocity of dimension acceleration
Since

$$a_x = \frac{dv_x}{dt} \quad (1)$$

To find the velocity of dimension acceleration , divide by dt :

$$v(a_x) = \frac{d}{dt}\left(\frac{dv_x}{dt}\right) = \frac{d^2v_x}{dt^2} = \frac{da_x}{dt} \quad (2)$$

Measured by ms^{-3}

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Or the velocity of the acceleration is the rate of dimension acceleration.

b) Velocity of time acceleration in one -dimension

since

$$a_t = \frac{dv_t}{dx} \qquad (3)$$

To find the velocity of time acceleration, divide by dt:

$$v(a_t) = \frac{d}{dt}\left(\frac{dv_t}{dx}\right) = \frac{d^2 v_t}{dt\ dx} = \frac{da_t}{dt} \qquad (4)$$

Measured by m^{-2} .

Or the velocity of time acceleration is equal to the rate of time acceleration.

2-a)Velocity of dimension linear momentum

Since

$$p_x = m\frac{dx}{dt} \qquad (5)$$

To find velocity of dimension momentum, divide by dt:

$$v(p_x) = m\frac{d}{dt}\left(\frac{dx}{dt}\right) = m\frac{d^2 x}{dt^2} = ma_x = F_x \qquad (6)$$

So the velocity of linear dimension momentum is equal to the dimension force(Nt).

b)Velocity of time linear momentum

since

$$p_t = m\frac{dt}{dx} \qquad (7)$$

To find the velocity of time momentum, divide by dt:

$$v(p_t) = m\frac{d}{dt}\left(\frac{dt}{dx}\right) = m\frac{dv_t}{dt} \qquad (8)$$

Measured by kg m^{-1} .

3- a)The velocity of dimension force:

Since

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$$F_x = \frac{dP_x}{dt} \tag{9}$$

To find the dimension velocity of dimension force, divide by dt:

$$v(F_x) = \frac{d}{dt}(\frac{dP_x}{dt}) = m\frac{d}{dt}(\frac{dv_x}{dt}) = m\frac{da_x}{dt} = mv(a_x) \tag{10}$$

Or the velocity of the dimension force is equal to mass times velocity of dimension acceleration.

Measured by kg ms^{-3}= N_t s^{-1}.

b) The velocity of time force:

since

$$F_t = \frac{dP_t}{dx}$$

(11)

To find the velocity of time force, divide by dt:

$$v(F_t) = \frac{d}{dt}(\frac{dP_t}{dx}) = \frac{d^2 p_t}{dxdt} = \frac{d}{dt}(\frac{dmv_x}{dx}) = m\frac{d}{dx}(\frac{dv_x}{dt}) = m\frac{da_x}{dx} = \frac{dF_X}{dx} \tag{12}$$

Or the velocity of the time force is equal change of the dimension force with respect to displacement change.

Measured by Nt/m= kg s^{-2}

4-a)The velocity of dimension energy

Since

$$E_x = \frac{{P_X}^2}{2m} = \frac{1}{2m}(\frac{mdx}{dt})^2 = \frac{m}{2}(\frac{dx}{dt})^2 = \tag{13}$$

To find the velocity of dimension energy, divide by dt:

$$v(E_x) = \frac{md}{2dt}(\frac{dx}{dt})^2 = \frac{md}{2dt}(v_x)^2 = \frac{mv_x dv_x}{dt} = mv_x a_x = p_x a_x \tag{14}$$

Or the velocity of dimension energy is equal to dimension momentum times dimension acceleration measured by Js^{-1} or $kg.m^2 s^{-3}$.

b) The velocity of time energy

Since

$$E_t = \frac{p_t^{\ 2}}{2m} = \frac{1}{2m}(\frac{mdt}{dx})^2 = \frac{m}{2}(\frac{dt}{dx})^2 \qquad (15)$$

To find the velocity of time energy, divide by dt:

$$v(E_t) = \frac{d}{dt}\frac{m}{2}(\frac{dt}{dx})^2 = \frac{md(v_t)^2}{2dt} = mv_t \frac{dv_t}{dt}\frac{dx}{dx} = ma_t \qquad (16)$$

Or the velocity of time energy is equal to time force measured by kg s m^{-2}.

5-a) The velocity of the dimension work

Since

$$W_x = F_x.dx = m\frac{dv_x}{dt}dx = mv_x dv_x = ma_x dx \qquad (17)$$

To find the velocity of dimension work, divide by dt:

$$v(W_x) = \frac{d}{dt}(F_x.dx) = m\frac{d}{dt}(\frac{dv_x}{dt}dx) = m\frac{d}{dt}(a_x dx) \qquad (18)$$

$$v(W_x) = m(\frac{da_x}{dt}dx + a_x\frac{d^2x}{dt^2})$$

$$v(W_x) = m(v_x da_x + a_x^{\ 2}) \qquad (19)$$

Measured by kgm^2s^{-3}

b) The velocity of the time work

Since

$$W_t = F_t dt = m\frac{dv_t}{dx}dt = mv_t dv_t \qquad (20)$$

We can find the velocity of time work by divide by dt:

$$v(W_t) = \frac{d}{dt}(F_t dt) = m\frac{d}{dt}(\frac{dv_t}{dx}dt) = m\frac{d}{dt}(a_t dt) \qquad (21)$$

$$v(W_t) = m(da_t + a_t\frac{d^2t}{dt^2})$$

(22)

Measured by kgm^2s

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6-a) The velocity of the dimension power

Since

$$P_x = F_x.v_x = m\frac{dv_x}{dt}v_x \qquad (23)$$

We can find the velocity of dimension power by divide by dt:

$$v(P_x) = \frac{d}{dt}(F_x.v_x) = m\frac{d}{dt}(\frac{dv_x}{dt}v_x) = m\frac{d}{dt}(a_x v_x) \qquad (24)$$

$$v(P_x) = m(\frac{da_x}{dt}v_x + a_x{}^2) \qquad (25)$$

Measured by kg m^2s^{-4}

b) The velocity of the time power

Since

$$P_t = F_t v_t = m\frac{dv_t}{dx}v_t \qquad (26)$$

We can find the velocity of dimension power by divide by dt:

$$v(P_t) = \frac{d}{dt}(F_t v_t) = m\frac{d}{dt}(\frac{dv_t}{dx}v_t) \qquad (27)$$

$$v(P_t) = m(v_t\frac{d^2v_t}{dxdt} + \frac{(dv_t)^2}{dxdt}) = m(v_t\frac{d^2v_t}{dxdt} + a_t\frac{dv_t}{dt}) \qquad (28)$$

Measured by kg m^{-3} s

Table 1: The velocity of dimensional and time rotation quantities

Velocity of quantity	**Dimension equation**	**Time equation**
Velocity of angular acceleration	$\omega(\alpha_\theta) = \frac{d\omega_\theta}{dt}$	$\omega(\alpha_t) = \frac{d\omega_t}{d\theta}$
Velocity of angular momentum	$\omega(L_\theta) = \tau_\theta$	$\omega(L_t) = m\frac{d\omega_t}{dt}$
Velocity of torque	$\omega(\tau_\theta) = m\frac{d\alpha_\theta}{dt}$	$\omega(\tau_t) = m\frac{d\alpha_\theta}{d\theta}$
Velocity of rotational energy	$\omega(E_\theta) = I\omega_\theta\alpha_\theta$	$\omega(E_t) = I\omega_t\frac{d\omega_t}{dt}$
Velocity of rotational work	$\omega(w_\theta) = I\frac{d(\alpha_\theta d\theta)}{dt}$	$\omega(w_t) = I\frac{d(\alpha_t dt)}{dt}$
Velocity of rotational power	$\omega(P_\theta) = I(\frac{d\alpha_\theta}{dt}\omega_\theta + \alpha_\theta{}^2)$	$\omega(P_t) = I(\frac{d^2\omega_t}{dxdt}\omega_t + \alpha_t\frac{d\omega_t}{dt})$

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Velocity of Electrical Quantities

1-a) Velocity of dimension electric current

Since

$$I_x = \frac{dQ}{dt} \tag{29}$$

We can find the velocity of dimension current by divide with dt:

$$v(I_x) = \frac{d}{dt}(\frac{dQ}{dt}) = \frac{dI_x}{dt} = \frac{d^2Q}{dt^2} \tag{30}$$

Measured by Amp.s^{-1}

b) Velocity of time electric current

Since

$$I_t = \frac{dt}{dQ} \tag{31}$$

We can find the time of dimension current by divide with dt:

$$v(I_t) = \frac{d}{dt}(\frac{dt}{dQ}) = \frac{d^2t}{dtdQ^2} \tag{32}$$

Measured by $Coul^{-1}$

RESULTS AND DISCUSSION

The produced equations give some ideas about the mechanical factors that it is to know the velocity of factor for example velocity of linear displacement momentum or velocity of time energy. The velocity of movement selects any factor is important to obtain the efficiency of these factor. This method leads to place an clear imaginary by derive the scalar or vector quantities by time. The efficiency of any device measures the ability to achieve the operation depend on the work per time that called the power, related to dimension factor. The new parameters could be activate the physical properties by applying the values e.g. power of instrument is worked 60W at 5s, so the velocity of power is 12W/s. Equations (2),(6),(10),(14),(18),(22), and (25) represent the dimension velocities of some mechanical quantities for example the velocity of dimension acceleration, the velocity of linear momentum, ect. Also equations (4),(8),(12),(16),(22), and (28) represent the velocity of mechanical quantities related to time. Its applications due to values produced by the factor achieved in the shortest time. Table 1 shows the velocities of rotational factors by dividing any parameter with time. Also an electrical parameters could be evaluate by dividing with time for example the velocity of displacement current passes in the less time.

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CONCLUSIONS

1- The velocity of the dimension and time acceleration is equal to the rate of dimension and time acceleration respectively.

2- The velocity of dimension and time momentum is equal to the dimension and time force respectively.

3- The velocity of the dimension force is equal to mass times velocity of dimension acceleration.

4- The velocity of dimension energy is equal to dimension momentum times dimension acceleration.

5- The velocities of dimension rotational quantities can be produced by divided with time.

6- The velocities of electrical current is equal to second derivative of charge with respect to time.

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