Momentum is not Conservation Principle

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Abstract: Momentum is not conserved, the momentum conservation law is wrong. So-called internal force is equal and orientation reverse geminate appear, the plight of naught of external force, total internal force vector sum of a system is zero, so the total momentum of the system does not change. this inference of the momentum conservation law, in fact, is only applicable in the particle one another collide, or collide plight with object centroid one another. when several objects at the same time interaction, of Its bring counterforce, sometimes do not do work to the object, at this time the vector sum of the system internal force, it not equal to zero may. so system momentum is conserved is anymore, namely momentum is not conserved.

Key Words: particle; momentum; conservation; impulse; vector.

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0 Introduction

[Natural science important event year table][1]inside,nought law of conservation of momentum record, [physics history] [2, 3] inside, also nought‘ law of conservation of momentum ’,or its concretely is via whom, at time what of record of found. at inside of general physics reference book[4,5], all have‘ law of conservation of momentum' of entry. physics or mechanics monograph of the overwhelming majority[6,7,8,9,10,11,12], all have‘ law of conservation of momentum' of canto chapter, and pertain the important chapter. some mechanics monograph[13,14], shall‘ law of conservation of momentum ' the table says for, law of conservation of momentum of linearity.

Concerning physics the book that show the experiment[15,16,17], the of enregister of experiment law of conservation of momentum, all is object simpleness linearity collide such experiment. Thereupon its of verification, the facto is just the partical and partical, or the object center of mass and center of mass impact, law of conservation of momentum of linearity. Thus far without any literature record, concerning law of conservation of momentum, in complicated substance system hold true, experiment such.

In classicality mechanics, the law of conservation of momentum can is from the direct derivative in the laws of motion of newton[7]. but its meaning, evident also merely fit substance linearity movement. the laws of motion of newton is to the principle between object linear movement and interaction of the expatiates, but toward intricate substance system and not mass center interactional complex mechanics course, but always doesnot the correlative experiment of the testify the conservation of momentum.

Thereupon, law of conservation of momentum hitherto that by attest, fact is inside the simple material system: the conservation of momentum of linearity of the simple interaction in matter. in complicated matter system, law of conservation of momentum not always useable!

1 Momentum is not conservation the system

1.1 The system sample of the collision

The system shown in Figure 1, is that the momentum is not conserved.

For instance graph, there are three objects of T_1 and T_2 and T_3, the mass of m_1 and m_2 and m_3. Hypothesis graph inside, parts of the movable pulley and a pulley rope etc, mass is zero and there is no friction. beginning, T_2 and T_3 are stationary . T_1 with velocity U, movement from the left side of the graph to the right side of the graph. when the impact to the pulley ropes parts, that is rivet on. and pull the pulley rope and pulleys and T_2 and T_3, moving all arise. the total momentum of the system, after impact, namely of change is occur. and before impact, the total momentum of the system is not the same.

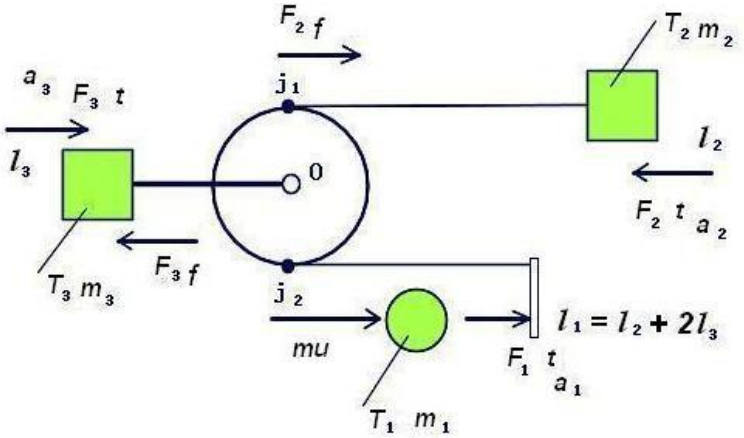

Figure 1

T_1 in the process of the above impact force hit the sheave member is F_1, otherwise T_2 and T_3 process respectively of the force F_2 and F_3 get. apparently force F_1 and F_2 and F_3 the between relationship , should be: $F_2 = F_1$ and $F_3 = F_1 + F_{2f}$. thereinto F_{2f}, is force F_2 of reaction force of equivalent reverse. the past when people calculate such problem, all gained are the result of momentum conservation. who would have thought that it is wrong.

In fact, the relationship between the force F_1 and F_2 and F_3, not just the $F_2 = F_1$; also should: $F_3 = F_1$; I.e.: $F_3 = F_2 = F_1$. wherein F_1 is the initial force, it respectively action to T_2 and T_3, became the F_2 and F_3. as previously mentioned $F_{2\,f}$, in fact is reaction force generated by the F_2. this force through the pulley rope and pulley, the reaction to the T_1, its doing negative work. it not equal to is the T_3, accept the force F_1 namely F_3 after, still again plus a $F_{2\,f}$ process.

1.2 $F_1 = F_2 = F_3$

Can prove that, during the impact, that T_2 and T_3 suffer The force F_2 and F_3, are all from T_1 impact force F_1 creation. withal: $F_1 = F_2 = F_3$. This is because, along with parts and the movable pulley and the pulley rope at via F_1, non - loss conducts to the T_2, is F_2, therefore $F_1 = F_2$.

Next, anent $F_1 = F_2 = F_3$; namely $F_3 = F_1$; may make people feel very confused, because according to previous mechanics computing method, seem this time F_3 ought is: $F_3 = F_1 + F_{2\,f}$; thereinto $F_{2\,f}$, the reaction force generated is cause F_2. interesting is that, if this calculation, the system shown in Figure 1, is still in line with the law of conservation of momentum. but This is wrong. force F_3 of moving T_3, namely actual is : $F_3 = F_1$.

2 Use accelerate even linearity movement equation testify

By the amount of displacement of the object, to calculate and attest this point. hypothesis T_1 and T_2 and T_3 the amount of displacement respectively is: l_1 and l_2 and l_3, as shown in Figure 1, i.e. there are: $l_1 = l_2 + 2\ l_3$. according to the displacement amount, namely to obtain acceleration, and calculate the actual forces.

Uniformity accelerated linear motion equation of motion is[7]: $l = l_0 + U_0 t + \frac{1}{2} a t^2$ (1)

Known: $l_1 = l_2 + 2\ l_3$. namely T_1 at with force F_1 time at the same, pull move the process of T_2 and T_3. thereinto pull the T_2 motion distance l_2, another $2l_3$ motion distance, correspond denote pulling T_3 motion distance l_3. because gist the principle of the movable pulley, namely the pulley move some distance, with the pulley rope shall to pull the double distance. therefore T_3 motion distance l_3, corresponding T_1 namely is moving pulling rope pulley 2 l_3. T_1 pull the pulley rope total length is: $l_1 = l_2 + 2\ l_3$, is at same time simultaneously achieve. explain T_1 pulling the entire length of the pulley rope, Involving the moves the T_2 and T_3 time, respectively aim T_2 and T_3 do all do work.. It also indicate T_1 is with a force F_1 the at same time, separate betake move to pull the T_2 and T_3. likewise T_1 pulling force of T_2 and T_3, full are the F_1.

Be capable of testify, in the pulley rope side pull the pulley rope of F_1 of the force, together with pulley pull move the force F_3 of T_3 is equal of the affirm.

For example, the mass of T_3 is m_3, well then at T_1 pull the pulley rope to timed, because the movable pulley utility, T_3 mass toward T_1 namely should subtract 1/2, namely m_3 / 2 or: $\frac{1}{2} \cdot m_3$

T_3 by the pulling force F_3 should be:

First l_3 into the formula (1) : $l_3 = l_0 + U_0 t + \frac{1}{2} a_3 t^2$

$$\therefore \quad \frac{2(l_3 - l_0 - U_0 t)}{t^2} = a_3 \quad (2)$$

$$\therefore \quad F_3 = m_3 \cdot \frac{2(l_3 - l_0 - U_0 t)}{t^2} \quad (3)$$

When the force F_1 via the pulley rope go drew move pulley and T_3, T_3 mass namely is equivalent to m_3 / 2, the displacement of the tension is 2 l_3.

At this time shall the conditions into the formula the (1) , thus: $2l_3 = l_0 + 2U_0 t + \frac{1}{2} a_{3d} t^2$

Therefore, this time: $F_1 = \frac{m_3}{2} \cdot a_{3d}$

Namely: $F_1 = \frac{m_3}{2} \cdot 2 \cdot \frac{2(l_3 - l_0 - U_0 t)}{t^2}$ (5)

$$\therefore \quad F_1 = m_3 \cdot \frac{2(l_3 - l_0 - U_0 t)}{t^2} \quad (6)$$

Expressions (3) and expressions (5) and expressions (6) of Comparison, is can see: $F_3 = F_1$.

3 Shall compute show use differential quotient

Shall compute above to mean with the derivative differential quotient. for instance by equation (2) can gained:

$$\frac{2(l_3 - l_0 - U_0 t)}{t^2} = a_3 \quad \therefore \quad \frac{2(\Delta l_3 - 0 - U_0 \Delta t)}{\Delta t} \cdot \frac{1}{\Delta t} = \frac{2\Delta u}{\Delta t} \quad \therefore \quad 2 \cdot \frac{du}{dt} = \lim_{\Delta t \to 0} \frac{2\Delta u}{\Delta t} \quad (7)$$

Similarly, by the formula (4) can also gained: $\frac{2(2l_3 - l_0 - 2U_0 t)}{t^2} = a_{3d}$

$$\therefore \quad \frac{2(2\Delta l_3 - 0 - 2U_0 \Delta t)}{\Delta t} \cdot \frac{1}{\Delta t} = 2 \cdot \frac{2\Delta u}{\Delta t} \quad \therefore \quad 2 \cdot \frac{2du}{dt} = \lim_{\Delta t \to 0} 2 \cdot \frac{2\Delta u}{\Delta t} \qquad (8)$$

Bring The formula (7) into the formula (3) can gained: $F_3 = m_3 \cdot 2 \cdot \frac{du}{dt}$ (9)

Formula (8) into the formula (4) and formula (5) also can gained: $F_1 = \frac{m_3}{2} \cdot 2 \cdot \frac{2du}{dt}$ (10)

Income result and the results of the previous reasoning is the same, all the same： $F_3 = F_1$.

This shows that，the T_1 at pulley rope side (j_2 side of Figure 1 of the pulley rope)pull move the pulley and T_3,the force (namely the force F_1), and the pulley pull T_3 (as Figure 1 pulley axletree o pulling T_3)of force the F_3 is equal. $F_3 = F_1$. namely gained exact prove is out of question.

Well then $F_3 = F_1$, already is no allow doubt. so the $F_3 = F_1 + F_{2f}$, is certainly wrong. such situation can expressed as, the system shown in Figure 1, force F_1 is at same time action at, the object T_2 and T_3, versus the two objects do work. As for T_2 and T_3 each of reaction F_{2f} and F_{3f}, all want reaction to the object T_1, in the above process only serve as supporting role. This can also be said, the F_{2f} although is fact be, but it was to the T_3 not do work. because not do work, therefore nor formation the impulse. nor shall at momentum of object engender affect.

4 The computing of the impulse and the variance of the total momenta in system

We now calculate, impulse of impact force process of the shown system of the Figure 1.

The integral calculus formula of the impulse is: $I = \int_{t0}^{t1} F dt$

Because $F_1 = F_2 = F_3$, F_1 and F_2 and F_3 impact process also time same. therefore T_1 and T_2 and T_3 each that suffer arithmetic of impulse and the gained numerical is sameness.

Namely:

$$I_1 = \int_{t0}^{t1} F_1 dt \qquad (11)$$

And: $I_2 = \int_{t0}^{t1} F_2 dt = \int_{t0}^{t1} F_1 dt$ (12)

$$I_3 = \int_{t0}^{t1} F_3 dt = \int_{t0}^{t1} F_1 dt \qquad (13)$$

This is Figure 1 inner, T_1 and T_2 and T_3 respective algorithm of the impulse, obtained number also sameness.

Objects suffer the impulse of the external force, equal to the increment of momentum of objects, namely the change of its momentum.

Let: $I_1 = P_1$, $I_2 = P_2$, $I_3 = P_3$.

Now come recur calculation, changes of the total momentum of the system.

Change of the total momentum of the system, should be: $Pi = \Sigma Ii$.

In this system, it should be the T_1 and T_2 and T_3 of object, each suffer impulse of the force the sum. thereinto T_2 and T_3, of the impulse of suffered, namely ought is equation (12) and (13) so shown. but I_2 should be negative. T_1 suffered impulse, ought is equation (11) as shown I_1, also should be take the same negative value of I_2. because here T_1 the suffered of the force, the reaction force of the force F_1 be, is and the F_2 direction same. reason why I_1 and I_2 take the negative and I_3 take the positive, all is because the direction of the force .

Therefore:

$$Pi = \sum Ii = -I_1 - I_2 + I_3 = -\int_{t0}^{t1} F_1 dt - \int_{t0}^{t1} F_2 dt + \int_{t0}^{t1} F_3 dt$$
$$= -\int_{t0}^{t1} F_1 dt - \int_{t0}^{t1} F_1 dt + \int_{t0}^{t1} F_1 dt = -\int_{t0}^{t1} F_1 dt \quad (14)$$

Namely this impulse and force process, occurrence momentum change:

$$Pi = -\int_{t0}^{t1} F_1 dt = -P_1 \quad (15)$$

Hereon before after of the impact process, the object T_1 and T_2 and T_3, all regard as is belong to the same system. Therefore, thereinto fashion all the force, also all is belong the internal forces of system, therefore, this namely equal to be saying, this system internal forces be, lead to changes in the total momentum of the system.

According to the analysis of the calculation process, regardless of the mass of objects T_1 and T_2 and T_3, become what kind of contrast relation. at hereinbefore dynamics process of the system, the changes of a momentum for taking place, all is as shown of the above formula(14) & formula(15).

5 Momentum is not conservation principle widespread exist

As shown in Figure 2. thereinto T_1 and T_2 and T_3 , correspond with T_1 and T_2 and T_3 of the Figure 1. Impact of similar since of occurrence, Its process and principle, also is in Figure 1 completely equivalent.

In Figure 2. after the impact, T_1 and T_2 engender coil the running of axletree O. The plight that is at this time, namely correspond the formerly system is at flatness to move the kinetic energy, become turn kinetic energy. The momentum that is at first, the conversion become the angular momentum of the rotation.

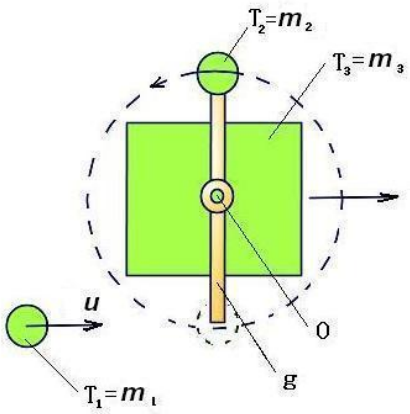

Figure 2

Not difficulty descry, to took place the object rotation in impact process of the any of, such

system above Similar, all shall occur the changes that sum cause this system momentum. its arguments all are the same. so momentum is not conserved,in the case of In the natural state, should also be universal exist. the law of conservation of momentum no more than in the particle system, the particle linear collision the instance aptness applicable.

6 Conclusion

Momentum is not conserved principle. the momentum of the matter system, at system is not gained to any external force of instance action, merely depend system inner object at action of force, also be capable of alter the total momentum of the system. this namely Momentum is not conserved principle. momentum conservation law and momentum is not conserved principle, is completely different and completely reverse to the physics concept. for example under the law of momentum conservation, from exterior observation of a physical system, when there is no force or any interaction with the outside world, this matter system will not change the state of their movement. moreover according to the momentum is not conservation principle, a object from exterior no observe adsum any force action, may suddenly change the status of the movement. it is by dint of from exterior completely invisible of, that of internal of action of force occurred changes.

System in Figure 1 shown, in its the process of internal mechanics,of momentum will be reduced. according to the show method of function: $Pi = f(F_n)$, or simple rational number addition and subtraction method(the Fn on behalf of the system internal dynamics action or internal force), all can testify to via such momentum change, be capable of evolvement come out multifarious inexhaustible change.

An object in space, a sudden change in the status of the movement. and its movement slows down or becomes faster, it is a sudden change in movement direction, It from quiescence suddenly moved come, or from moved suddenly quiescence come. all this wholeness, from the outside of the objects have all not observed adsum any external force or external interactions exist, but it all is took place. this namely momentum is not conservation principle.

We testify momentum is not conserved. testify of in mechanics process of system, without external force of action will occur as follows momentum change:

$$Pi = -\int_{t0}^{t1} F_1 dt = -P_1$$

namely momentum is not conservation principle:

$$Pi = f(F_n) \qquad (16)$$

function: $Pi = f(F_n)$ explain, in a matter system in its own internal forces action, its momentum can in 0 and between the positive and negative values arbitrariness be changed.

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