ENERGY = (11/14) MASS (VELOCITY OF LIGHT)^2

Nrusingh Charan Mohapatra , M.Sc., M.Phil.
Retd Reader in Mathematics, B. P. College ,Odisha , India

ABSTRACT

The energy is the ability of a body to do the work .The work done is the measure of the kinetic energy of the body .The kinetic energy of a body is the energy possessed by the body by virtue of its motion .The work is said to be done by a force acting on a body such that the body is displaced actually in any direction except in a direction perpendicular to the direction of force . Work done = Force * Displacement = Energy

When a mass of wood burns at that time the fire is created .That fire is the combination of heat energy and light .This implies that energy comes from a mass of matter. Light is the property of heat , because heat exhibits light at a fixed temperature of the matter. **When the heat exhibits light from a mass of matter at that stage that mass is converted to energy . So the velocity of light is used for the calculation of energy .**

Rotation is motion and vice versa .Every point of a wheel moves simultaneously in a vertical curved path as well as a horizontal straight line path in a rotation .

If a force is applied on a wheel and that force simultaneously converts to the centripetal force as well as the centrifugal force then the wheel moves forward. So everybody moves vertically in a curved path to cover horizontally on a straight line path. The following laws are derived from the above fact as follows ,

LAW OF MOTION ---------------------- Nrusingh's 1st law

(a) INERTIA OF REST : A body is at rest, until the applied force on it , converts to the centripetal force as well as the centrifugal force .

(b) INERTIA OF MOTION : A body is at motion, as long as the applied force on it , converts to the centripetal force as well as the centrifugal force .

The following law is derived from **Nrusingh's 1st law**

"THE FORCE OF ACTION IS ALWAYS EQUAL TO THE SUM OF OPPOSITE REACTION AND ABSORPTION" -------------------------- **Nrusingh's 2nd law**

This implies that "**14 PARTS ACTION = 11 PARTS REACTION + 3 PARTS ABSORPTION** "

LAW : THE ACCELERATION OF A BODY IS DIRECTLY PROPORTIONAL TO THE RESULTANT FORCE AND INVERSELY PROPORTIONAL TO ITS MASS .

1

The following law is derived from **Nrusingh's 2nd law**

Force = (11/14) mass * acceleration -------- Nrusingh's 3rd law

where (11/14) is the constant of proportionality

But **Work done = Force * Displacement = Energy**

So the energy equation is derived from **Nrusingh's 3rd law** of force as follows

ENERGY = (11/14) MASS * (VELOCITY OF LIGHT)^2

As **1 part action = (11/14) part reaction + (3/14) part absorption** ,

So 1 part of energy formation = (11/14) part of energy generation + (3/14) part of energy absorption in the surrounding .This implies that , (11/14) part of energy is generated out of 1 part of energy formation when the rest (3/14) part of energy is absorbed in the surrounding .

KEY WORDS : Energy, Work, Mass, Force, Displacement, Constant of proportionality, Absorption, Action, Reaction, Centripetal force, Centrifugal force, Cycloid , Straight line path

INTRODUCTION

Action means, the force exerts on the second body by the first body.

Reaction means, the force exerts on the first body by the second body.

Absorption means, the amount of force is absorbed in the second body .

When a force is applied on a body and that applied force simultaneously converts to the centripetal force and centrifugal force then the body moves some distance.

That is, by the action on the body, the body moves some distance by its reaction and absorption .The wheel of a vehicle moves uniformly on a road.

So the action, absorption and reaction relation can be derived accurately from the motion of a wheel on the road.
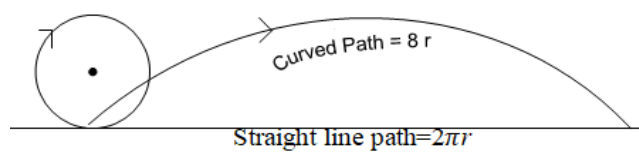
When a force is applied to a wheel, the wheel rolls on the road so that every point on it which touches the road moves vertically on a cycloid path to cover horizontally on a straight line path in its every rotation .

2

The cycloid is a curved path, which is traced out by a point on a circle that rolls on a straight line . The lengh of the cycloid is calculated by the length formula of calculus as 8r and the length of the horizontal straight line path is $2\pi r$,

Where r is the radius of the circle which generates the cycloid. Every point rotates on the wheel to move vertically on a cycloid path, which is a part of the circular path, hence the centripetal force acts on it. Centripetal force is a force, which is required to move a body uniformly on a circle. This force acts along the radius and towards the centre of the circle.

While moving along a circle the body has a constant tendency to regain its natural straight line path .This tendency gives rise to a force, which is called the centrifugal force .

It acts along the radius and away from the centre of the circle .Centripetal force is the action force and centrifugal force is the reaction along with absorption force. The centripetal force and the centrifugal force are equal in magnitude and opposite in directions. So where is centripetal force, there is centrifugal force also.

Every point on the wheel moves vertically 8r length by the centripetal force   and

Simultaneously   the same point covers $2\pi r$ length horizontally by the centrifugal force.

Suppose s_1 = length of the cycloid path and s_2 = length of the straight line path

So $s_1 = 8\,r$ and $s_2 = 2\,\pi\,r$

Here $8r \ > \ 2\pi r \quad => \ s_1 > s_2$

Suppose v_1 = Velocity of any point on the cycloid path $= \dfrac{ds_1}{dt}$

And v_2 = Velocity of the same point on the straight line path $= \dfrac{ds_2}{dt}$

As $s_1 > s_2 \ => \ \dfrac{ds_1}{dt} > \dfrac{ds_2}{dt}$

So $v_1 > v_2 \ => \ mv_1 > mv_2$

$=> \quad m\dfrac{dv_1}{dt} > m\dfrac{dv_2}{dt}$

$=> \ ma_1 > ma_2 \quad Hence \quad F_1 > F_2$

where $\dfrac{dv_1}{dt} = a_1 \quad , \quad \dfrac{dv_2}{dt} = a_2$

$F_1 = ma_1$ and $F_2 = ma_2$

The magnitude of the centripetal force is equal to the magnitude of the centrifugal force.

Hence $F_1 = F_2 +$ SOME ABSORBED FORCE

As $F_1 > F_2$

So $F_2 +$ SOME ABSORBED FORCE
        $=$ CENTRIFUGAL FORCE

and $F_1 =$ CENTRIPETAL FORCE

This implies that ,   ACTION FORCE $=$

REACTION FORCE + ABSORPTION FORCE

So ACTION $=$ REACTION + ABSORPTION

3

Centripetal force is applied on the point of a wheel so the point moves **8r length** on the cycloid path. Centrifugal force is utilized on the Straight line path so the Same point covers **$2\pi r$ length** on it .

Hence $F_1 : F_2 =$

ACTION OF CENTRIPETAL FORCE :

REACTION OF CENTRIFUGAL FORCE

So $F_1 : F_2 = 8r : 2\pi r = 8 : 2\pi$

$= 8 : (2 * 22/7) = (8 * 7/7) : (2 * 22/7)$

$= 56/7 : 44/7 = 56 : 44 = 14 : 11$

This implies that, " TO EVERY 14 PARTS OF ACTION , THERE IS 11 PARTS OF REACTION "

The magnitude of the centripetal force is equal to the magnitude of the centrifugal force.

So each one of centripetal force as well as the centrifugal force must do equal amount of work .But here centripetal force does more work than the centrifugal force, this implies that some amount of centrifugal force is absorbed on the road .

Hence 14 PARTS ACTION – 11 PARTS REACTION = 3 PARTS ABSORPTION

To every 14 parts of action, there is 11 parts of reaction and 3 parts of absorption . This implies that

14 PARTS ACTION = 11 PARTS REACTION + 3 PARTS ABSORPTION

So **1 part action = (11/14) part reaction + (3/14) part absorption**

The law states that on it

THE ACCELERATION OF A BODY IS DIRECTLY PROPORTIONAL TO THE RESULTANT FORCE AND INVERSELY PROPORTIONAL TO ITS MASS

Suppose F = Resultant force , which makes the body to move ,

m = mass of the body and

a = acceleration of the body .

Mathematically , the above law can be expressed in the following two ways

Acceleration of the body is directly proportional to the resultant Force

i.e. $a \propto F$ ----------------(1)

and also

Acceleration of the body is inversely proportional to the mass

i.e. $a \propto (1/m)$ ----------------(2)

Combining the above two equations (1) and (2) it is obvious that

Acceleration of the body is directly proportional to (Force / mass)

i.e. $a \propto F * (1/m) = (F/m)$

Its converse is also true

So **(Force / mass) is directly proportional to acceleration of the body**

i.e. $(F/m) \propto a$

This implies that , **Force is directly proportional to (mass * acceleration)**

i.e. F ∝ (m * a)

But F ∝ (m * a)

So **Force = k (mass * acceleration)**

where k = Constant of proportionality

As 1 part action = (11/14) part reaction + (3/14) part absorption ,

So it is obvious that

1 part of the centrifugal force = (11/14) part of the centrifugal force used for motion + (3/14) part of the centrifugal force used for absorption .

Out of 1 part of the centrifugal force , (11/14) part of the centrifugal force is used for the motion of the body and simultaneously the rest (3/14) part of the centrifugal force is used for the absorption purpose in that medium.

It is obvious that without absorption, there is no motion.

As (11/14) part of the centrifugal force is used only for the motion purpose out of the 1 part of the centrifugal force , Hence

Constant of proportionality=k=(11/14)

It is obvious that

Force = k (mass * acceleration)

This implies that

Force = (11/14) mass * acceleration

Hence **F = (11/14) m * a =**

THE ACTUAL RESULTANT FORCE, WHICH DOES THE WORK.

SUBJECT MATTER :

Case -I :

The velocity of light is 3 lac km/s. Any body can not move at the speed of light . **Suppose a body moves in a velocity very close to the velocity of light in the unit time by a uniform force F** .The constant force acts on the body so that the body is pumped by the energy and the momentum of that force .

Momentum = mass * velocity

$p = m * v$, where p = momentum

m = mass of the body and v = velocity of the body .

Since the body moves in the velocity very close to the velocity of light, so the body moves a distance **c** at a unit time .

Here **c** = velocity of light = distance

Work done =W = Force . distance = F * S

So W = F * S = F * c

Here S = distance , F = force and S = c

This implies that **W = F * c** ---------(1)

The rate of change of the momentum of an object is directly proportional to the external force.

Mathematically , it can be expressed as

i.e. **dp/dt ∝ F**

where p = momentum and dp/dt = rate of change of momentum and F = external uniform force

5

The converse of this law is also true .

So **The external force of an object is directly proportional to the rate of change of the momentum .**

Mathematically , it can be expressed as

$F \propto dp/dt \implies F = k (dp/dt)$

$\implies F\ dt = k\ dp$ ---------------- (2)

where k is the constant of proportionality Applying the **integral symbol** in both sides of the equation (2) ,It is obtained that

$\int F\ dt = \int k\ dp \implies F \int dt = k \int dp$

where **k = constant of proportionality and F = Uniform Force**

But $F \int dt = k \int dp \implies F\ t = k\ p$

As $\int dt = t$ and $\int dp = p$

Hence $F * t = k * p$ ---------------- **(3)**

As **(11/14) part of the centrifugal force is used for the motion purpose and the rest (3/14) part of the force is used for absorption purpose out of 1 part of the centrifugal force**

So **k = (11/14)** , where **p = mv**

t = unit time = 1 and v = c

Hence putting the values of k , p and t in equation (3) , It is obtained that

$F * t = k * p \implies F * 1 = (11/14)\ m\ v$

$\implies F = (11/14)\ m\ c$ ----------------**(4)**

Now Putting the equation (4) in the equation (1) , It is obtained that

$W = F * c = (11/14)\ m\ c * c$

This implies that $W = (11/14)\ m\ c^2$

Since **W = work done = Energy = E**

Hence $E = (11/14)\ m\ c^2$

This implies that

Energy = (11/14) mass * (velocity of light)^2

Case - II :

The work is said to be done by a force acting on a body such that the body is displaced actually in any direction except in a direction perpendicular to the direction of force .

Work done = Force * Displacement

i.e. $W = F * S$ ---------------- (1)

where W = work done , F = uniform force and S = Displacement

F = (11/14) m * a ------ Nrusingh's 3rd law

Here F = uniform force , m = mass of the body and acceleration of the body = a = dv/dt

Since **F = (11/14) m * a**

F = (11/14) m * dv/dt where dv/dt = a

At uniform force , when a body reaches its maximum velocity ,which is very close to the velocity of light , then the body does not accelerate further at that stage. So the acceleration becomes velocity as a result the body moves in a uniform velocity, which is approximately equal to the velocity of light .

So **dv/dt = v = c** where c = velocity of light

But F = (11/14) m*a = (11/14)m * dv/dt

So F = (11/14) m * v = (11/14) m * c

6

Hence F = (11/14) m * c ------------ (2)

Putting the value of equation (2) in

Equation (1) , It is obtained that

W = F * S = (11/14) m * c * S

As the body moves in a velocity which is very close to the velocity of light and the distance covered by the body in unit time is the velocity of light = c , So   S = c

Hence   W = F * S = (11/14) m * c * S

= (11/14) m * c * c = (11/14) m c^2

Here **w = work done = kinetic energy**

= energy =E

The kinetic energy of a body is the energy, possessed by the body by virtue of its motion.

Hence   W = (11/14) m c^2 = Energy

This implies that, **E = (11/14) m c^2**

CONCLUSION :

The energy of a mass of matter is directly proportional to the product of its mass and the squared velocity of the light . Mathematically ,   it can be stated as

E ∝ m c^2 => E = k * m c^2

where **k = constant of proportionality**

Work done = Force * Displacement

and **Work done = Energy**

Hence   Energy = Force* Displacement

As   **F = (11/14) m * a**   Nrusingh's 3rd law

So **k=constant of proportionality=11/14**

Now   E = k * m c^2 = (11/14) m c^2

Here   E = Energy ,   c = velocity of light

and   m = mass of a body

Hence   E =(11/14) mc ^{2}

Mass of a matter is converted to energy according to the law **E = (11/14) mc^2** and energy is concentrated to mass by the **Universal Law** . **1 part action = (11/14) part reaction + (3/14) part absorption . This implies that , (11/14) part of energy is generated out of 1 part of energy formation when the rest (3/14) part of energy is absorbed in the surrounding . Hence**

E=(11/14) m c^2--Nrusingh's Energy Law

REFERENCES :

The followings are the published papers of the IJSER journal .
1) Nrusingh's 1st law

IJSER , volume 10 , issue 12

December-2019 , ISSN 2229-5518

2) Nrusingh's 2nd law

IJSER , volume 6 , issue 7

July-2015 , ISSN 2229-5518

3) Nrusingh's 3rd law

IJSER , volume 11 , issue 3

March-2020 , ISSN 2229-5518

7