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Modification of Newton's Third Law: Every Action has Time and Properties Dependent Reaction

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Abstract: *According to Newton's third law: Every action has equal and opposite reaction. However the reaction always depends upon the properties of substances (intensive and extensive) and on time coordinate (space time: t), which has not been reflected in the above law. In fact, according to Newton's third law $F_{AB} = -F_{BA}$ which is scientifically and mathematically invalid. The force applied on the object always may not be lead to reaction, but only the effective action (Threshold force) will show reaction. The derivation; Force (N) = mass (kg) × $\frac{d^2s}{dt^2}$, has been provided in required section of the manuscript as the proof of the justification. The above equation justifies that, time and properties of a substance are two unavoidable parameters, which influences the action-reaction on/by the substance, as same action on different object will show different reaction whether it is natural or artificial. Hence, it can be concluded that each action-reaction on/by any universal substance depends upon time as well as properties of the Substance. So, every action has equal and opposite reaction is not universal and hence can be modified as: Every action has time and properties dependent reaction.*

***Key Words*: Action, Reaction, Time, Properties, Dependent**

1. INTRODUCTION

According to Newton's third law: Every action has equal and opposite reaction. However, it can be observed that this law is not universal and fails in many practical action-reaction phenomenons [1]. This law has completely ignore the properties (intensive and extensive) of matters as it is well known that different elements has different properties (intensive and extensive) which basically depends upon their electronic arrangements, number of electrons/ protons /neutrons, morphology, stability etc. [2]. Except it, another important factor is, this law has not given any importance to time, which is an important coordinate (space time, t) [3]. So the modification of Newton's third law is required to make it universal and for this purpose the properties of matter (intensive and extensive) and space time (t) have to taken in to account. In this regard some of the natural and artificial action-reaction relationship on universal objects has been provided below to prove that: Every action has time and properties dependent reaction.

2. JUSTIFICATION

This section contains some of the natural and artificial action-reaction relationship on universal objects which is beyond Newton's third law, i.e. every action has equal and opposite reaction, In fact according to Newton's third law $F_{AB} = -F_{BA}$ which is scientifically and mathematically invalid. A schematic representation has been provided In Figure 1.

Moreover, if the shape of the spherical object will be changed to any other shape just like hexagonal shape, then their reaction will change simultaneously depending upon time. The mathematical derivation has been provided below:

Every force applied on the object always may not be lead to reaction, because

Force (N) = mass (kg) × acceleration (m/s^2) … (1)

$$\text{Acceleration (m/s}^2\text{)} = \frac{\text{Force (N)}}{\text{mass (kg)}} \quad \ldots(2)$$

It represents "Force > mass", for a body/object to show any acceleration (reaction). Hence every action will not show reaction (equal and opposite) but only the effective action (Threshold force) will show reaction.

Moreover,

$$a = \frac{dv}{dt} = \frac{d^2s}{dt^2} \quad \text{as, } (v = \frac{ds}{dt}) \quad \ldots(3)$$

(v = velocity, s= displacement, a = acceleration, t= time)

So, by putting equation 3 in equation 1:

Force (N) = mass (kg) × acceleration (m/s^2)

$$\text{Force (N)} = \text{mass (kg)} \times \frac{d^2s}{dt^2} \quad \ldots(4)$$

The above equation simply represents the action is directly proportional to the mass of the object and inversely proportional to the square of Time for the desired reaction (displacement: d^2s).

The above explanations proved that the reaction basically depends upon the nature/property (intensive and extensive) of the object. In addition to it, Time (space time, t)

is the most important coordinate on which every universal object is dependent. So it has a major role to influence the reaction of an object under provided action. So on the basis of above explanation, Newton's third law can be modified to a universal law i.e.: Every action has time and properties dependent reaction.

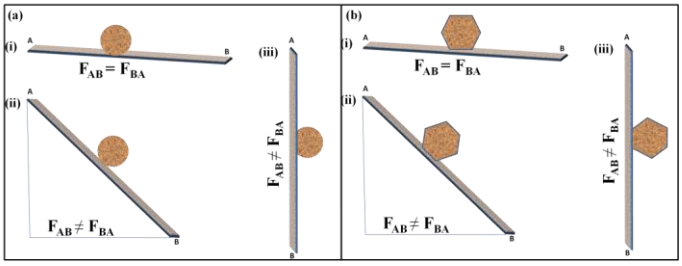

Fig-1: Schematic representation of "time and properties dependent" action-reaction by a spherical and hexagonal object.

3. CONCLUSIONS

From this analysis, it can be concluded that:

(i) The physico-chemical properties of each object are almost different, so the reactions produced by them are too different even if in same action condition.

(ii) Every action will not show reaction (equal and opposite) but only the effective action (Threshold force) will show reaction.

(iii) Force (N) = mass (kg) × $\frac{d^2s}{dt^2}$

So, Newton's third law can be modified to a universal law i.e.: Every action has time and properties dependent reaction.

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Conflict of interest:

There is no conflict of interest.

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[2]https://en.wikipedia.org/wiki/Intensive_and_extensive_properties.

[3] https://en.wikipedia.org/wiki/Spacetime.