Abstraction In Theory- Laws of Physical Transactions

SUBHAJIT GANGULY
78/4, SELIMPUR ROAD,
DHAKURIA, KOLKATA - 700 031 (INDIA)

Abstract :-

Considering transport or tendency of transport of physical entities from an initial to a final point, we come to a similar basis of understanding of various physical phenomena. The trajectory-behavior of such transport represents the effect or field of influence. This way, we may explain cluster-formation in the universe, an expanding universe, etc. This may also lead to a similar basis for understanding the four non-contact forces of nature. Also, for different ranges of acceleration in the field formed in space-time, we have different properties of matter interacting. This may explain the difference in ranges of the various forces.

Introduction:

All phenomena we see around us are but a physical or imaginary transport of various quantities starting from the flow of gases, to formation of fields of gravity, magnetism, etc., photons moving in space-time, right to the formation of cyclones and hurricanes, occurrence of events may be considered to be simply the transaction of physical or abstract entities between two points- one 'initial' and the other 'final'. The transfer of these various quantities, however, may not always be considered simple, and the 'route' of the transfer may form a complex relation with what may be called an environment. These transactions, however complex, must be obeying some physical laws, though, and all of them must be measurable for all physical considerations. There must be a same set of physical and mathematical laws governing all such transactions in every frame of reference. Consequently, we may consider the same set of a single mathematical construct, a set of equations that can safely describe all these phenomena satisfactorily. That concerned set of equations may take different forms, however, in different sets of events, but there must be a singular basis for all these. In a nutshell, we must be able to conjure up a mathematical idea that can explain such transfers of all known physical entities.

Developments in the mathematics of 'Chaos Theory' have pointed towards statistical analysis not to be always 'deterministic'. Meaning which, we cannot always predict a single solution to a given transfer in consideration, if it tends into the chaotic region of prediction. This however does not restrict us in finding mathematical tools for describing all possible routes that can be taken up by a given system in reaching a final point from an initial one. Taking into account all such possible routes of transfer or transactions, the safety of predictions increases to a maximum.

Factors governing transport:

Let us consider, somewhat arbitrarily, the factor that will govern the transfer of a given physical entity from an initial point 'A' to a final point 'B'.

(F) Be the quantity of flow that takes place between the points, which are a distance (D) apart. Now, there can be a support(S) towards the flow and a resistance(R) opposing it. For, example, considering the spread of a given quantity of isolated gas in space from one point to another, the kinetic energies of the individual molecules may be taken to constitute the support towards the flow and the force of attraction between the molecules constitute the concerned resistance. Finally, let the quantity (T) represent the time in which the flow or transfer, we are concerned with between the points A and B is complete.

Now, all other physical factors remaining constant, we have, respectively:-

$$F \propto \frac{1}{D}$$

$$\propto \frac{1}{R}$$

$$\propto T$$

$$\propto S$$

The flow we are concerned with must also depend upon another factor. This being the difference in concentrations (λ) of the related physical entity between the two points concerned. All other factors remaining constant,

$$\frac{F}{T} \propto \lambda$$

Thereby, combining all concerned relations, we get:-

$$F \propto \frac{\lambda ST}{DR}$$

or,

$$\boxed{F = \omega \frac{\lambda ST}{DR}} \quad \text{.......................} (1);$$

Where ω is a constant of proportionality.

Let us now consider the flow of an energy quantum, with frequency (υ) in a given direction in vacuum. The distance (D) of transport in that given direction can be considered to be (cT); where 'c' is the velocity of energy-quantum in vacuum and (T) is the time of transport.

For empty environment in which the flow takes place, we may assume that the concerned difference in concentrations between the initial and the final points,

$$\lambda = h\upsilon$$

Where h is Plank's constant.

Placing $D = cT$ and $\lambda = h\upsilon$ in equation (1), we get:-

$$F = \frac{\omega h\upsilon S}{cR}$$

Again, as the energy-quantum moves from the initial to the final point completely, the concerned flow,

$$F = h\upsilon$$

Placing this value of F in the previous equation, we get:-

$$\omega = c\left(\frac{R}{S}\right)$$

Assuming, the resistance against the concerned flow and the support towards it for the energy i.e., considering R=S, we have:-

$$\boxed{\omega = c} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

The value of the constant ω may therefore be replaced by the speed of light in vacuum, c, in the equations concerning transport of a given physical entity.

Such a transfer of any physical entity as described by equation (1), will continue until and unless the difference in concentrations concerned, i.e., λ becomes zero. Considering the example of heat transfer from a body at a higher temperature to one at a lower temperature, heat will continue to flow towards the colder body, until and unless the difference in concentrations, i.e., the difference in temperatures of the hotter body and the colder one becomes zero. Similarly, a given body will keep moving with uniform velocity in a straight line, until and unless there is an acceleration or retardation (support or resistance, respectively, as the case might be), in accordance with equation (1)

In general, the following may be postulated form equation (1):-

1) Any given physical quantity flows from a region of higher concentration of it to a region of lower concentration of it, until the concentrations in both the regions is the same.
2) Support (S) towards the concerned flow being zero in a given direction, the rate of flow (dF/dT) is zero, as there is practically no flow in that given direction.
3) Resistance (R) against the flow being zero, time taken for completion of the

concerned flow is zero. Thus, if no resistance is present against the occurrence of a given event, it occurs practically instantaneously.

4) Considering any given region as a collection of a finite or an infinite number of initial and final points, we can say that any given entity within the region tends to flow equally in all directions. However, support and resistance towards and against a flow in any given direction will decide the routes of such a transport.

Instability in a System:

The logical approach that has been undertaken in studying transfer of a given entity between points seems to have led us to what may be called super-stability. As the given physical entity tends to flow equally in all directions, it seems that the universe, as we know it, should have been highly stable, with almost equal quantities of all physical quantities spread equally everywhere. Both matter and energy should have been in equal or almost equal proportions everywhere. But this is not so. The very logic concerned may be made use of to explain this seeming anomaly.

Let us consider the example of a three points isolated system. Let the point be 'A', 'B' and 'C'. A and B be material points, whereas, C be situated anywhere on the straight line joining A and B. The material parts of both A and B tends to move in all possible directions. These possible directions include the directions towards each other. Thus, at point C, for obvious reasons, an additional effect will be felt due to the tendency of material to flow from A to B and from B to A, as compared to all other directions.

The points A, B and C being considered parts of an isolated system and all three points being assumed fundamentally similar (with the only difference that A and B contain material, while C is empty), the factors R and S must be equal.

Placing this condition in equation (1) and replacing ω by c, for reasons stated earlier, we get:-

$$\frac{F}{T} = c\frac{\lambda}{D}$$

'D' being considered the distance between A and C and 'x' the distance between A and B (say), the distance between B and C is 'D-x'.

The effect on C due to the material- point A can thus be written as:

$$\frac{F_A}{T_A} = \frac{c\lambda_A}{x}$$

Similarly, the effect on the empty point C due to the material- point B is:-

$$\frac{F_A}{T_A} = c\frac{\lambda_A}{D\text{-}x} \quad ;$$

Where F_A and F_B are the respective values of flows towards the point C due to A and B, respectively. T_A and T_B are the respective values of time and λ_A and λ_B are the respective values of the differences in concentrations of the concerned entity between A and B.

Substituting x in the above two equations, we have:-

$$c\,\frac{T_A\lambda_A}{F_A} = D - c\,\frac{T_B\lambda_B}{F_B} \quad \text{.................................} (3)$$

Considering the points to be having equal factors, i.e., considering $\lambda_A = \lambda_B = \lambda$ (say), $F_A=F_B=F$ (say) and $T_A=T_B=T$ (say), equation (3) reduces to:-

$$c\,\frac{T\lambda}{F} = D - c\,\frac{T\lambda}{F}$$

i.e.,
$$\frac{F}{T} = 2c\left(\frac{\lambda}{D}\right) \quad \text{...................................} (4)$$

Equation (4) describes fundamentally the effect (i.e., the flow F in time T) of two material points having same factorial conditions regarding one or a number of entities. Considering a collection of such points and applying a statistical approach, the logistic equation (due to May, 1976) for (F/T) can be written as:-

$$2c\left(\frac{\lambda}{D}\right)_{t+1} = 2Kc\left(\frac{\lambda}{D}\right)_t\left[1-2c\left(\frac{\lambda}{D}\right)_t\right]$$

i.e.,
$$\left(\frac{\lambda}{D}\right)_{t+1} = K\left(\frac{\lambda}{D}\right)_t\left[1-2c\left(\frac{\lambda}{D}\right)_t\right] \quad \text{.............................} (5)$$

Where K is a constant.
Also, the quadratic map (due to Lorentz, 1987) can be written as:-

$$2c\left(\frac{\lambda}{D}\right)_{t+1} = K - \left(2c\,\frac{\lambda}{D}\right)_t^2$$

i.e.,
$$2c\left(\frac{\lambda}{D}\right)_{t+1} = K - 4c^2\left(\frac{\lambda}{D}\right)_t^2 \quad \text{...................................} (6)$$

All trajectories described by the quadratic map become asymptotic to $-\infty$ for

$$K<-0.25 \text{ and } K>2$$

As we deal with the flow of a given material entity towards one given point or the effects on a given point, the expression for the attractor for each such point can be written as:-

$$\boxed{\left(2c\frac{\lambda}{D}\right)^{*} = \left(1-\frac{1}{K}\right)} \quad \text{.. (7);}$$

Where O<K<B

$\left(2c\frac{\lambda}{D}\right)^{*}$ is a point in the desired dimensional plot into which the trajectories seem to crowd. As we do not need to deal with more than one attractor or periodic point, the trajectories will tend to revisit only the attractor point concerned, to the desired level of accuracy of observations and calculations.

In equation (7), for $K \geq 3$, the trajectory behaviour becomes increasingly sensitive to the value of K. there are a few more points to be noted regarding the dependence of the trajectory behaviour on the values of K:-

1) For $K \leq 1$, the attractor is a fixed point and has a value 0.
2) For $1<K<3$, the attractor is a fixed point and its value is >0 but <0.667.
3) For $3 \leq K \leq 3.57$, period doubling occurs, with the attractor consisting of 2, 4, 8, etc., periodic points as K increases within that range.
4) For $3.57<K \leq 4$, we have the region of chaos, where the attractor can be erratic (chaotic with infinitely many points) or stable.

For all calculations, the desired conditions may be placed at the attractor. A trajectory never gets completely and exactly all the way into an attractor though, but only approaches it asymtotically. In the region of chaos, we apply the method of searching for windows or zones of K- values for which iterations from any initial conditions will produce the periodic attractor, instead of a chaotic one. For the logistic equation (5), the most common such zone lies at $K \approx 3.83$ and for the quadratic map (6), at $K \approx 1.76$.

Making use of equations, (4), (5), (6) and (7), the effect of material- points on their surroundings can be studied. Also, it is important to note that the presence of material-points ensures trajectories of all possible routes of the transfer of entities and these may be even chaotic in nature. The geometry around such points must therefore depend upon the probabilities concerned of the given trajectories revisiting the attractor – point. Transport of any physical entity (or even if it tends to be transported) will therefore affect the geometry of the surroundings in a similar way. Thus, we are bound to have fundamentally similar trajectories in all cases of transfer of entities. This being true, an actual transport or a 'tendency' of transport of any physical entity and its effect may fundamentally be predicted in a single similar fashion. By selecting the initial and final points or regions concerned effectively, in any given scenario, we must be able to describe the behaviour of the transport to the desired level of accuracy, by studying the trajectories of it. Choosing appropriate factors too should be necessarily sufficient in taking care of the desired level of accuracy in calculations.

The tendency of the material-points to flow towards each other as discussed must be sufficient to explain the absence of super-stability in the universe. Also, the non-material or empty points in the vicinity of the material points, as discussed earlier, tend to behave just as material-points, thereby causing a change in the whole vicinity or environment concerned. This predicts the presence of 'fields' in the environment of material and non-material points, further nullifying the super-stability of the universe, explaining why we see the world we see it.

Using Lyapunov exponents for a transport as described by equation (4), and replacing $2c\left(\frac{\lambda}{D}\right)$ by a quantity 'τ', we have:-

$$\frac{d}{d7} f^{n}(\tau) = \frac{\delta n}{\delta o}$$

i.e., $$\boxed{\frac{\delta n}{\delta o} = \prod_{i=1}^{n} f'\left(\tau_i\right)} \quad \text{.................................. (8)}$$

$$b = \frac{1}{n} \log_e \left(\frac{\delta n}{\delta o}\right)$$

i.e., $$\boxed{b = \frac{1}{n} \sum_{i=1}^{n-1} \log_e |f'\left(\tau_i\right)|} \quad \text{...................................... (9);}$$

Where b is a constant (the local slope of all possible routes), and

$$\boxed{\Psi = \lim_{n \to \infty} \frac{1}{n} \sum_{i=1}^{n-1} \log_e |f'\left(\tau_i\right)|} \quad \text{...................................... (10);}$$

Where, Ψ is a constant.

Using equations (8), (9), and (10), the probabilistic plots of all possible routes of transport are to be found, for a given scenario. These plots, in turn, yield the description of the effect or field of the concerned transport or transaction. Depending upon the transport being considered we may have the respective sort of field, viz., electromagnetic, gravitational, etc. These fields, however, being fundamentally similar probability plots of all possible routes of transactions of physical or imaginary entities must have a similar basis for comprehension. Thus, there must be a grand unification of all physical theories of transport.

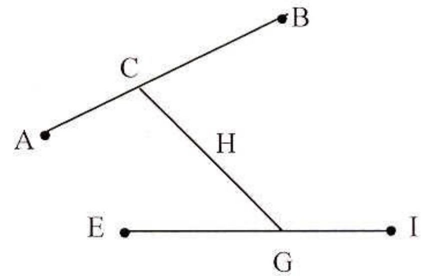

Fig: four material points A, B, E and I, and two non-material points C and G in their respective vicinities.

Let us consider, as shown in the figure above, four material-points A, B, E and I, and two non-material or 'empty' points C and G, anywhere on the straight-lines AB and EI respectively. Let the points A, B, E and I have equal factorial conditions of material transport (equal to 'F') difference in concentrations of material (equal to 'λ') and concerned time (equal to 'T'). Also, let AB and EI be having equal straight-line distances (equal to 'D'). The effects due to A and B on the point C and those due to E and I on the point G are both, by equation (1),

$$\frac{F}{T} = 2\omega \left(\frac{\lambda}{D}\right)$$

ω being constant for the given system of transactions concerned.

Considering another point H anywhere on the straight line distance between the points C and G, an effect must be felt at H too, due to the point C and G. by equation (1)this effect must be $\left(2\frac{F}{T}\right)$ or $\left(2\omega \frac{\lambda}{D} + 2 \frac{\omega\lambda}{D}\right.$, i.e., $\left.4 \frac{\omega\lambda}{D}\right)$. The points C and G, and as a consequence the point H too, inspite of being considered empty points, are seen to behave just as material points in the vicinity of material transactions. Effects of such a transaction affect non material points and these non-material points in return can thus affect other material or non material points. Thus, the points themselves that we consider, irrespective of being empty or containing material, behave as if being in a same kind of transport themselves as any material, in accordance with equation (1). Therefore, we are to deal with not only real material transport, but transport of abstract entities too. Not only must a physical entity tend to move towards all points in its vicinity, the points that we consider, themselves must tend to be moving in all possible directions as we can see. The points themselves will have to be studied therefore by their trajectory behavior as described by equations (5), (6) and (7) and their effects or fields of influence by equations (8), (9) and (10).

The amount of information required to describe the trajectory of a concerned plot to within an accuracy or length of measuring tool (ε) be (I_{ε}), say. We have :-

$$I_\varepsilon = \sum_{i=1}^{N} P_i \log_2 (1/P_i) ;$$

where P_i represents the concerned relative frequencies or probabilities of individual observations. Writing logarithmically (arbitrarily), we have:-

$$I_\varepsilon = a + D_I \log_2 (1/\varepsilon) ;$$

Where a is constant, and

$$D_i = \lim_{\varepsilon \to o} \left[\frac{I_\varepsilon}{\log_2 (u/\varepsilon)} - \frac{a}{\log_2 (u/\varepsilon)} \right]$$

$$D_i = \lim_{\varepsilon \to o} \frac{I_\varepsilon}{\log_2 (u/\varepsilon)} \; ; \quad \frac{a}{\log_2 (u/\varepsilon)}$$

being sufficiently small to be neglected (v represents the unit length of the original). The necessity of $I\varepsilon$ to fall within the desired value is absolute, barring which safety of predictions using the plot concerned is hampered. Ruler-length decreasing to O, we have:-

$$D_e = \lim_{\varepsilon \to o} \frac{\log N}{\log_2 (1/\varepsilon)} \; ;$$

Where D_e is the concerned dimension of measurements.

Starting measurements relating to two regions, one initial and the other final, each such region may be further considered to be a collection of some other regions. The scaling operation is performed such that:-

1. There are a finite number of sub-divisions.
2. Step 1 is repeated on each new facsimilie.

Thus, we have the dimension,

$$D = \frac{\log N}{\log_2 (1/r)} \; ;$$

Where, N is the number of facsimiles and r represents the scaling- ratio (i.e., 1/number of sub-divisions)

Also, for an unit length (u),

$$u = r^D N$$

For irregular forms, however, the estimated unit length,

$$L = \varepsilon N$$

Inserting a constant of proportionality (a) in ($N = 1/R^D$), for going from unit length to a measured length, we get:-

$$N = a\,(1/R^D)$$

Further, inserting new scaling length (ε) in place of (r) we have:-

$$N = a\,(1/\varepsilon^D)$$

Thus, from the equations ($L = \varepsilon N$) and ($N = a/\varepsilon^D$), we have:-

$$L\varepsilon = a\,\varepsilon^{1-D}$$

The value of D for an irregular line (e.g., a Von Koch snowflake or a coastline) is between 1 and 2. The slope of a line fitted to all the points taken from the coastline may be estimated to be,

$$m = 1 - D$$

Using desired scaling-lengths the necessary factorial conditions for a given transport may be estimated to the necessary level of accuracy, for performing calculations. Each of the quantities in equation (1) may have a given number of dimensions for a given level of accuracy in predicting the routes of transaction. For the desired level of accuracy, any of the quantities (L_i) may be considered to depend upon (n) number of parameters (P_i). A desired level of accuracy for a given set of measurements can be achieved by knowing exactly the necessary parameters for the observations. In this respect, auto-correlation coefficient or lag-m serial correlation coefficient may be employed. This coefficient being,

$$A = \frac{\sum_{t=1}^{N-m} (P_t - \overline{P})\,(P_{t+m} - \overline{P})}{\sum_{t=1}^{N} (P_t - \overline{P})^2}$$

Where P represents the mean value of the concerned parameter.

At a lag of O, the co-ordinates of each plotted point are equal, auto-correlation coefficient being maximum. Auto-correlation decreases with increase in lag. By adequate accuracy in observations for a desired set of measurements, a necessary level of accuracy may thus be achieved.

Spillage in all possible directions may be prevented, for a given scenario, by the factorial conditions R or S for each of these directions.

An expanding Universe :-

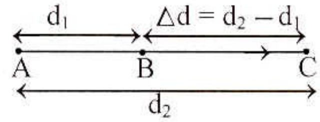

Fig: relative motion of a point from B to C, in vicinity of point A..

Let us consider a point of reference A.. Let another point move from point B to point C, with respect to point A. Let B and C be at distances d_1, and d_2 respectively from point A. Considering S=R for the flow, and λ to be a constant (considering the movement of the concerned point from one 'empty' place to another), from equation (1), we have, $\frac{F}{T} \propto \frac{1}{D}$.

Thus, as the flow takes place from B towards C, as the distance between B and C ($\Delta d = d_2 - d_1$) decreases, the velocity of the flow, F/T increases. Thus, an observer at A will see that the velocity of the moving point goes on increasing as it keeps moving away from A. This is in consistency with Hubble's law ($v = Hr$), for an expanding universe.

As the point B keeps moving away from A towards point C, the effect of point A on point B goes on decreasing. The effect of the field around the reference point seems to lessen thus with distance, getting the points further from it to spread away with increasing velocity. The distance between the reference point and the moving point being sufficiently greater than the 'size' of the points concerned, this spreading away from the reference point assumes considerable importance for obvious reasons.

The Four Non-Contact Forces

The four non-contact forces, viz., the electromagnetic, the weak, the strong and the gravitational forces, being considered the effects of transport of respective entities, may be treated as per equation (1). Equations (8), (9) and (10) would yield the probabilistic plots or fields of all routes of actual transport or tendency of transport in each case. When the distance between the concerned initial and final points of transport become sufficiently large however than the 'size' of the points, the trajectories tend to become chaotic, thereby increasing the uncertainty of predictions. This uncertainty, in turn, depends upon the Lyapunov exponents (ν). Moreover, there is a stretching or shrinking of a given direction according to the factor $e^{\nu t}$, according as V being positive or negative in that direction.

Let us suppose a system is characterized by a positive ν, i.e., ν_+ and its initial state is defined within a size ε. Then, in time T, the uncertainty in the co-ordinates concerned will have expanded to the size L of the attractor.

$$L \sim \varepsilon e^{\nu_+ T}$$

or,

$$L \sim \varepsilon e^{KT}$$

Either of these relations may be solved for the prediction-time,

$$T \sim \left(\frac{1}{\nu+}\right) \log_e \left(\frac{L}{\varepsilon}\right)$$

or,

$$T \sim \left(\frac{1}{K}\right) \log_e \left(\frac{L}{\varepsilon}\right)$$

The prediction time, therefore, increases only logarithmically with the precision of the initial measurement. Thus, in such chaotic states, where the size of the concerned points becomes sufficiently small or large as compared to the concerned distance in-between, only short-term predictions are possible.

Let a region in space-time be represented by,

$$s = (cT)^{4i};$$

Where c is speed of light in vacuum and $i = \sqrt{-1}$.

Let us consider the introduction of a given physical property, viz., mass, charge, colour, etc., in this region. The vicinity s will be affected by this introduction and let this vicinity presently become,

$$s' = (cT')^{4i}$$

(If the size of the concerned source of disturbance is very small or very large as compared to its vicinity, chaotic states prevail, and no long term prediction will be possible.)

The change in space-time configuration,

$$\begin{aligned} \Delta s &= (cT)^{4i} - (cT')^{4i} \\ &= c^{4i} (T - T')^{4i} \\ &= c^{4i} (\Delta T)^{4i} \qquad \text{(replacing } T - T' \text{ by } \Delta T\text{)} \end{aligned}$$

This change in the space-time configuration will be caused as all the points in the vicinity of the source of the concerned physical property is affected by its field, as stated earlier. The velocity of this change in space-time configuration,

$$v = \frac{c^{4i} (\Delta T)^{4i}}{T}$$

And, the acceleration related to this velocity will be,

$$a = \frac{c^{4i} (\Delta T)^{4i}}{T^2}$$

This acceleration will be felt by the concerned physical property in the vicinity of the source. As such, there will be a force for each of these properties concerned, viz., gravitational force for mass, electromagnetic for charge, color-force for color, etc. The value of time in the space-time is different for each of such interactions. The strength of the interacting force for each property is different too, therefore. In a system, where the resistance R and support S for a change are equal, i.e., for a neutral system, we have,

$$\frac{F}{T} = c\,\frac{\lambda}{K}$$

For the concerned field of influence, relating to the space-time vicinity,

$$F = (cT)^{4i}$$

Also,

$$D = (cT)^{4i};$$

as the distance of influence will be equal to the flow, F.

Combining the last three relations, we get,

$$\frac{(cT)^{4i}}{T} = c\,\frac{\lambda}{(cT)^{4i}}$$

i.e.,

$$T = \frac{\lambda^{\frac{1}{8i-1}}}{c}$$

Also, for such a neutral system, the difference in concentrations, λ, will be equal to the quantity of the property concerned, that is introduced, (say, A); i.e.,

$$\lambda = A \qquad \text{and} \qquad \Delta\lambda = \Delta A$$

Thus, we have,

$$T = \frac{A^{\frac{1}{8i-1}}}{c}$$

The change in configuration therefore is,

$$\Delta s = c^{4i} \quad \Delta T^{4i}$$

$$= c^{4i} \left\{ \frac{(\Delta A)^{\frac{1}{8i-1}}}{c} \right\}^{4i}$$

$$= (\Delta A)^{\frac{4i}{8i-1}}$$

Also, the acceleration in the vicinity of the source,

$$a = \frac{c^{4i} \left\{ \frac{(\Delta A)^{\frac{1}{8i-1}}}{c} \right\}^{4i}}{\left(\frac{A^{\frac{1}{8i-1}}}{c} \right)^{2}}$$

i.e.,

$$a = c^2 \frac{(\Delta A)^{\frac{4i}{8i-l}}}{(A)^{\frac{2}{8i-l}}} \qquad \text{.............................. (11)}$$

Thus, the force that will be felt due to a quantity $A^{/}$ of the property A in this field of acceleration is,

$$F = A^{/}\, c^2 \frac{(\Delta A)^{\frac{4i}{8i-l}}}{(A)^{\frac{2}{8i-l}}} \qquad \text{.............................. (12)}$$

The strength of this force, as stated earlier, will be difficult for each concerned physical property. However, there must be some similar basis of interaction with each of these strengths of forces. The trajectory behaviour for each of these fields of force may be studied using the Lyapunov exponents. For one-dimensional studies, the logistic equation similar to equation (5) may be used. For studying such trajectory behaviour in two-dimensional frame, a quadratic map similar to equation (6) may be used. Also, equation (7) gives the attractor for the trajectories concerned.

Also, the quantity of force forming due to the interaction of a property in a given acceleration-field, a, may be considered to be different. Interaction of different properties of matter, viz., mass, charge, color, etc., with the same acceleration-field may yield forces of different ranges. Thus, it may be considered that at different ranges of acceleration different properties of matter will interact, although, these may do so in an equivalent manner. Therefore, there must be different ranges of forces that have influence over different properties. This is consistent with available data. The types of forces that are seen arise due to the interaction of respective properties with an equivalent acceleration field.

CONCLUSION :-

Starting with studying actual transport or tendency to transport of entities, we arrived at a conjecture, a theory that all physical phenomena may be explained through a single rule and thereby may be studied in a similar way. In each of these considerations, we take into account the initial and the final points of transport or flow. Choosing appropriate parameters for measurement and applying adequate observation, we can find the trajectories or the effects or fields of their behaviour. For a given set of calculations, we will have to take care of the desired level of accuracy for the intended set of results. Even if we conveniently omit a few parameters or information regarding such transport, we may be able to reach our desired level of accuracy. Reaching towards the complete set of parameters though, will ensure moving towards complete accuracy of predictions, even if the related trajectories become chaotic. The prediction-time in chaotic regions becomes less though. Placing the desired direction of flow of the given physical entity along a given direction, we may find the extent of flow that spills into any of the other remaining directions.

We have also explained cluster-formation, or the coming together of physical entities in the universe, and the stability of such systems. An expanding universe may also be explained in a similar way.

Finally, considering transport or tendency of transport of different physical entities, we may arrive at the unification of the four non-contact forces of nature. A force arises due to the interaction of a given physical property with an acceleration-field, created due to the same property or an equivalent one. Different physical entities interact with different ranges of the acceleration-field and this may give rise to different ranges of the various forces.

REFERENCES :-

1. On the non-existence of a slow manifold, E.N. Lorenz, V. Krishnamurthy (1987), Journal of atmospheric science, 44, 2940-2950.
2. Low-order models and their uses, E.N. Lorenz, D. Reidel Publishing Co, 557-567.
3. Lyapunov Exponents without Rescaling and Reorthogonalization, Salman Habib, Robert D. Ryne (1995), Physical Review Letters 74: 70-73.
4. Chaos, Scattering and Statistical Mechanics, Baker, G.L. (1996), Cambridge University Press.
5. Simple Mathematical models with very complicated dynamics, R.M. May (1976), Nature 261-459.
6. Chaotic dynamics, Gollub, J.P. Baker, Cambridge University Press.