A proposal of a symmetrical base partial differential equations embed for a class of manifold metrology-A partial differential equation embedded Riemannian manifold-

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Abstract: The methods of the system analysis are often use kinds of partial differential equations. The economical, the physiological and psychological, the medical and the neuroscience recognition-brain science field the scientific knowledge become important. The system analysis of these fields should be able to apply to develop these metrology to be economical analytical methods. This paper develops and proposes a metrology of analysis of these concerned fields graphical base topologically symmetrical method. The metrology based approach should be the same method as such kinds of partial differential equations with various conditions and the results of analysis were investigated various analytical methods. The proposed metrology is newly conducting kinds of partial differential equations embedded Riemannian manifold to investigate the metric as the Riemann metric. The metrology of the proposed topological base system analysis of the Riemann metric must be developed as the graph theory of the system obtained as the metrical tiled structure.
[Ryota Ishibashi, Hideo Fujimoto. **A proposal of a symmetrical base partial differential equations embed for a class of manifold metrology-A partial differential equation embedded Riemannian manifold-.** *J Am Sci* 2018;14(3):67-76]. ISSN 1545-1003 (print); ISSN 2375-7264 (online). http://www.jofamericanscience.org. 10. doi:10.7537/marsjas140318.10.

Keywords: Riemannian manifolds, Riemann Metric, Graph theory, Embedded problems, A partial differential equations embedded Riemannian manifolds

1. Introduction

The symmetrical method of the proposed is the metrology of the pattern generation as we call the satisfaction of the Riemann metric. The model of the pattern can be generated the rule of the Riemannian manifold. The proposed procedure means that the metrology of the symmetry of system analysis. The meanings that the symmetry of the system as we call the Riemannian manifold of the symmetrical system are constructed dynamical mechanisms with its parameters and tiled like structures. The system parameters were adapted to the environment to detect the phenomena (Ishibashi 2014; Hogan 1984). The construction of the system is modeled as the graph theory base method that metrology of the constructed.

The metrology to develop the model of the analysis should be better to use the method as like a kinds of partial differential equations (Ishibashi 2012; Iwata 1996; Yoshikawa 1990).

The method of the resolution and obtained solution of the partial differential equation especially embedded the manifold such as Riemannian manifold should be difficult to solve (NASA Facts, NASA Dryden Flight Research Center 2005; NASA/ TM-2003-210741 2003; Report/Patent Number ARC-EDAA- TN28796 2016; Reports/Patent Number: ARC-E-DAA-TN32592 2016; NASA Documents) and discuss its solution. The reason why if the method becomes complex and problemable is that reason that the method of the partial differential equations need the condition to obtain solutions (Serrin 1959; Moser 1961, 1966; Nirenberg 1972; Elworthy 1970; Jacobowitz 1972). And also the symmetrical metrology that of the metric of the system of the partial differential equations were system that of the directable to calculate and the inverse of the partial differential equations (Ryota Ishibashi 2007, 2012), etc are the methodologically obtained solutions. The symmetry is one way to solve the problem to discuss the system as the kinds of partial differential equations embedded Riemannian manifold (Ryota Ishibashi 2014, 2014, 2017; John Nash 1956 1966 1952 1954 1958). The method of the proposed should be described as the method based on the manifold as the Lie bracket as we call the system's symmetrical formulate (Ishibashi Ryota 2014, 2014, 2016, 2017).

The formulated structure of the proposed must be the Riemannian manifold and the formulated of the symmetrical shape should be the same as the description of the embedded partial differential equations embedded Riemannian manifold.

The theological assumption base analyses of the Riemann metric of the graph theoretical models were calculated. The method of the theory of metric defined the graph, theory asymptotically defined symmetrical topology, of the metric base of a kinds of the partial differential equations embedded Riemannian manifold on the system of the developed simulation model as we call the partial differential equation base analysis. The system of a methodological

symmetry of the graph must be able to express the Riemannian manifold that means the structure shows the Riemannian manifold and the construction of its metric shows the partial differential equations.

The metrology of the system analysis to obtain these kinds of the class of the partial differential equations results as the metric must be difficult to obtained (Ryota Ishibashi 2012; Iwata 1996; Yoshikawa 1990; Arimoto 1996, 2010), such as the fields of embedded topological applications, analytical solutions to obtain the metrology of the curvature space, connect ability with the each discrete topological models, Lie bracket base algebraic phenomena and also the phenomena of the various fields to the metrology use application as some industrial and economical financial trading or market base analysis. The system of the kinds of the partial differential equations (Serrin 1959; Moser 1961, 1966; Nirenberg 1972; Elworthy 1970; Jacobowitz 1972) must be topologically defined and then the metric of them were often obtained but it becomes difficult to obtain the metrology of the topologically curvature space as the non Euclid geometrical space should be defined as the Riemannian manifold (Ryota Ishibashi 2014, 2014, 2017; John Nash 1956, 1966, 1952, 1954, 1958) base metric.

The metrology base approach must be appropriate of the assumption base the simple structure of the symmetrical method of some kinds of partial differential equations embedding the Riemannian manifold.

The metrology of the non Euclid space should be some kinds of partial differential equations of the system to be discussed as the methodologically defined models that were proposed. Those models of procedure must be Remain as following asymptotic phenomena base analysis of the metric of the curvature space norm formulate. These results described are that of the Riemann metric of the topologic symmetrical modeled formed graph. These methodologically defined results obtained that of the topologically defined newly proposed a symmetrical tilings problem of the curvature space as we call non Euclid geometrical fields must be remained as the Riemann metric.

2. Material and Methods

The methods of the system analysis are often use kinds of partial differential equations. The economical, the physiological and psychological, the medical and the neuroscience recognition-brain science field the scientific knowledge become important.

The formulated structure of the proposed must be the Riemannian manifold and the formulated of the symmetrical shape should be the same as the description of the embedded partial differential equations embedded Riemannian manifold.

The system analysis of these fields should be able to apply to develop these metrology to be economical analytical methods. This paper develop and propose a metrology of analysis of these concerned fields graphical base topologically symmetrical method. The metrology based approach should be the same method as such kinds of partial differential equations with various conditions and the results of analysis were investigated various analytical methods. The proposed metrology is newly conduct a kinds of partial differential equations embedded Riemannian manifold to investigate the metric as the Riemann metric. The metrology of the proposed topological base system analysis of the Riemann metric must be developed as the graph theory of the system obtained as the metrical tiled structure.

2.1 Theorem 1

The system of the proposed method for a Lie bracket base metric and kinds of the partial differential equations embedded Riemannian manifold to be explained. The main topic of the system to be developed is that the meanings of the one way to solve the embedded problem of the kinds of partial differential equations. The main results shows that the meanings of the Riemann metric, the results of one example of the partial differential equation embedded.

Riemannian manifold. Fig. 1 shows a Riemannian manifold. A partial differential equations embedding Riemannian manifolds with proposed symmetrical Magic Triangle formulate.

The results show the results of one example of the partial differential equation embedded Riemannian manifold.

Here we think about the problem is the tessellation of the regular polygon. Z_i and n must be natural number. Then we obtain the combinations $\{n, Z_i\}$ as {3, 6}, {4, 4}, {6, 3}, for the tilings. This paper proposed the metrology of the symmetrical models as the partial differential equations embedded Riemannian manifold. The edge of the honeycomb cell should be better not to affect the effects of such a kind of the honeycomb proposed cell. Then, {6, 3} as the honeycomb of the hexagon minimizes the sunlight which viewed along the z axis. Hexagon shape is the fewest of the surface cell area.

2.2 Theorem 2

The neighbors as the meanings of the graph theory are methodologically the sets of vertex as we call the nodes and sets of the vertices.

The system as described graph theoretical phenomena should be the methodologically solved as the manifold base approach. Here we assume that the system of the graph modeled system of some kinds of partial differential equations embedded Riemannian manifold.

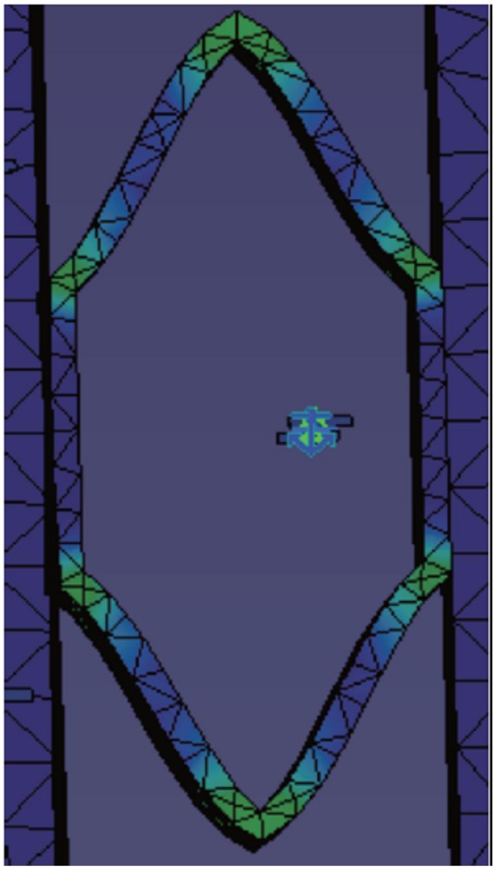

Fig. 1. The metrology of proposed.

The method based on the model base approach of the symmetry defined system construction base approach to define some kinds of partial differential equations embedded Riemannian manifold. The main topics of the research are that the applicable of the Lie bracket theory to be solved as the manifold to discuss the phenomena base approach to be discussed. The symmetrical metrology should be the method of the geometrical structure construction problem as the Lie bracket problem description as the bracket of the system be the manifold base approach should be written as the lie algebraic approach as we call the metrology of the manifold base such kinds as the Riemannian manifold as we call the method as the Riemann metric.

This paper proposed the metrology of the symmetrical models as the partial differential equations embedded Riemannian manifold. The symmetrical models were constructed as the topological models of the graph theory. The graph models were constructed as the symmetrical structure. Here, we assume that the cell geometry be graph G, then neighborhood of the Ni of the i th node point becomes as follows.

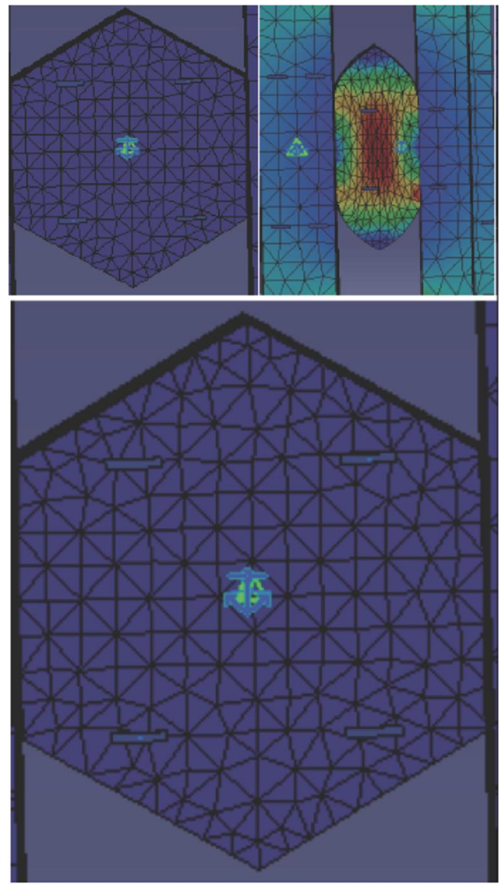

Fig. 2. A Riemannian manifold. A partial differential equations embedding Riemannian manifolds with proposed symmetrical Magic Triangle formulate.

$$N_i = \{j | j \in \nu(G) : (i,j) \in \varepsilon(G)\}, \qquad (1)$$

Where, ν(G) and ε(G) are finite set. ν(G) is vertex set andε(G) is edge set of the graph G. Here, we assume that edge connectivity of the i th node point as Zi. Zi be the average number of sides meeting at a vertex. Let n the natural number be

$$n = \frac{2Z_i}{Z_i - 2} \qquad (2)$$

Here we think about the problem is the tessellation of the regular polygon. Zi and n must be natural number. Then we obtain the combinations {n,Zi} as {3, 6}, {4, 4}, {6, 3}, for the tilings. This paper proposed the metrology of the symmetrical models as the partial differential equations embedded Riemannian manifold. The edge of the honeycomb cell should be better not to affect the effects of such a kind of the honeycomb proposed cell. Then, the {6, 3} as the honeycomb of the hexagon minimizes the sunlight which viewed along the z axis. Hexagon shape is the fewest of the surface cell area.

Next, we think about the metrology which acts to the structure. It is preferable that the metrology for expansion and contraction to be allowed. It is preferable that the metrology doesn't disturb the manifold. This research, the metrology is defined of the metrology of the Riemannian manifold.

Here, we assume that the regular polygon that nodes points and vertices. Let m be the degrees of freedom and we obtain the following equation.

It is assumed to be some kinds of partial differential equations. Let m the natural number set as

$$m = 3(n - j - 1) + \sum_{i=1}^{j} f_i. \tag{3}$$

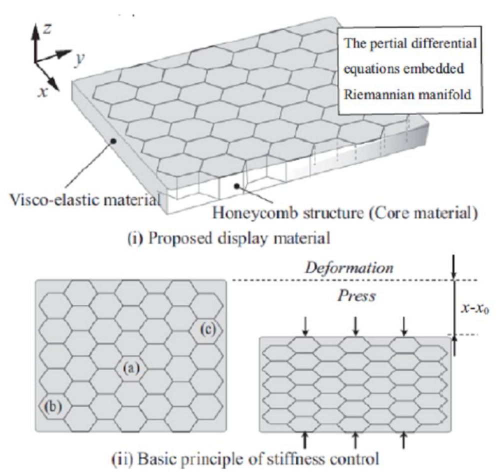

Fig. 3. A Riemann metric of the partial differential equations embedding Riemannian manifolds with proposed symmetrical Magic Triangle formulate.

Here, n is a number of nodes, j is number of vertices, and fi is DOF (degrees of freedom) of the one node of them. All the nodes are assumed to be the number of a pair of vertex of one DOF. Then, deformation degrees of the hexagon as the combinations {6, 3} become three degrees of freedom. The compressive deformation that uses one vector becomes possible as shown in Fig. 1(b). The metrological difference must be able to explain various shapes and it becomes possible to define a kind of the metric by assuming the three DOF. It is possible to expand and contract in the direction of the x axis and the direction of the y axis when the core material is put internally like Fig. 1. Moreover, it has a high stiffness and it stabilizes structurally for the metrology from the direction of the z axis. Therefore, appropriate softness as the positive definite value can be presented by combining with a metrology that some kinds of partial differential equations embedding Riemannian manifolds.

Fig. 2 shows a single cell geometry filled the fluid effected structure. When the displacement x with initial value x0 will add to the cell, then the system of the cell of the honeycomb structure is the system of the proposed leaves growth models of the wind effected and then the volume becomes as follows:

$$V_n = 2mxh\frac{2}{\sqrt{3}}x_0 + 2mxh\sqrt{\left(\frac{2}{\sqrt{3}}x_0\right)^2 - x^2} \tag{4}$$

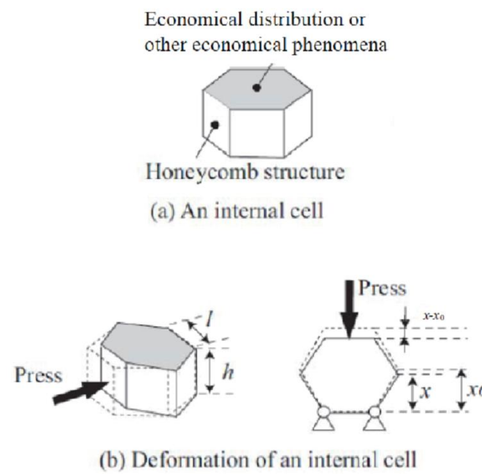

Fig. 4. An economical applications. An example of the Riemann metric defined metrological definition that a kinds of partial differential equations embedded Riemannian manifold.

The volume of the system must be the deformation dependent values as follows described.

Fig. 3 shows a model of the cell matrix set Δ with m cells. Here we simplify the tessellation problem. Fig. 4 shows a economical applications. An example of the Riemann metric defined metrological definition that a kinds of partial differential equations embedded Riemannian manifold were explained visually. Fig. 3 (a) shows a standard row where cells are connected to construct a line. Then the cell matrix will be constructed to make a rectangle like shape (the nx column and the ny row). Si is the subset of the set Δ and it can be inductively defined as follows.

The magic triangle formulate

(1) $S_1 = \{a_1\}, \{a_1\}$ *is the arbitrary member of the set* Δ

(2) $S_2 = \{a_1, a_2\}, \{a_1\}$ *and* $\{a_2\}$ *share the one edge*

$$
\begin{aligned}
&(3)\ If\ 2 \leq i\ and\ S_1 = \{a_1, a_2, ..., a_i\}\ can\ be\\
&\quad defined,\\
&\quad S_{i+1} = \{a_1, a_2, ..., a_i, a_{i+1}\}\\
&\quad 1 \leq h \in Z,\ k \in Z \leq i,\ h < k\\
&\quad (i)\ a_h, a_k \in S_i\\
&\quad (ii)\ \{a_h, a_{h+1}\}, \{a_k, a_{k+1}\},\\
&\quad each\ of\ them\ share\ one\ edge.
\end{aligned} \tag{5}
$$

Let prime Ni be the set of node points j at most near the point i other than i. Then prime Ni becomes adjacent points of i and the number of prime Ni becomes 2 or 3. Let we call the vertex of Sn satisfies prime Ni = 3 as the good-vertex, and let the detail of such the good-vertex be λSn. Then we call the edge εij of the Sn consists of the good-vertex i as good-edge, and let the detail of such the good-edge be ΓSn. Here we call such a set Sn as magic-triangle, and then, the number of edges consists of vertex of Sn satisfies prime Ni = 3 becomes 4m.

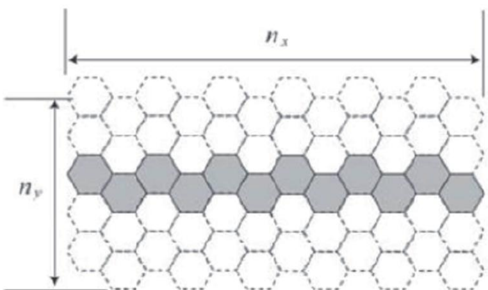

Fig. 5. A tiled Riemann metric.

Here we assume that the edges and the nodes be the node point as the DOF that defined manifold base curvature space. When the displacement ||x − x0|| add to the tiled Riemann metric, the volume becomes as follows: These mean some kinds of the partial differential equations embedding Riemannian manifolds of the space defined symmetrical magic triangle formulate.

$$
V_n = 2mxh\left\{\sqrt{\left(\frac{2}{\sqrt{3}}x_0\right)^2} + \sqrt{\left(\frac{2}{\sqrt{3}}x_0\right)^2 - x^2}\right\} \tag{6}
$$

$$
= 2mxh\sqrt{\left(\frac{2}{\sqrt{3}}x_0\right)^2 + \left\{\sqrt{\left(\frac{2}{\sqrt{3}}x_0\right)^2 - x^2}\right\}^2 + 2\left(\frac{2}{\sqrt{3}}x_0\right)\sqrt{\left(\frac{2}{\sqrt{3}}x_0\right)^2 - x^2}}
$$

$$
\simeq \int_a^b \sqrt{E\left(\frac{du}{dt}\right)^2 + 2F\left(\frac{du}{dt}\frac{dv}{dt}\right) + G\left(\frac{dv}{dt}\right)^2}\, dt.
$$

This equation means a norm of the curvature space as we call the Riemann metric

From the Eq. (5) and the Eq. (6), we can see that the stiffness of the cell matrix can be controlled by the displacement x with initial value x0. Here, we assume that the displacement u is added to system symmetrical structure of the model as follows.

$$
\hat{m}\ddot{x} = -d\dot{x} - k_1 x - \hat{k}_2(x - u),
$$

Where m, d is the positive values and also k is the positive value.

$$
u = Asin\omega t,
$$

We add a control input to the system. Common case, we set the parameters amplitude A and the frequency omega. If we want to make a vibration display with the frequency omega, we adjust the stiffness k = k1 + k2 by using a following stiffness adjustment method to realize the resonance condition.

$$
\hat{k}_2 = k_0 + \gamma\int_0^t \left(\dot{x}(\tau) - \frac{k_1}{b}u(\tau)\right)x(\tau)d\tau,
$$

$$
\omega = \sqrt{\frac{\hat{k}}{\hat{m}}}
$$

with the frequency omega. Then, to investigate the stability of this controller we use a candidate of the Lyapunov function as follows.

The main results of the main formatted method are adjusted. The tuning method satisfy the Barballat's Lemma (Suguru Arimoto 1996, 2010).

$$
W = \hat{m}\left(\dot{x} - \frac{k_1}{b}Asin\omega t\right)^2 + \hat{m}\omega^2\left(x - \frac{k_1}{b\omega}Acos\omega t\right)^2 + \frac{1}{\gamma}\{\hat{k} - \hat{m}\omega^2\}^2,
$$

$$
\dot{W} \leq 0
$$

2.3 Theorem 3

The metrology of proposed method to be adjustment of the impedance parameter is an example to indicate. The metrology of the proposed method based on the Riemannian manifold should be written as below.

The moment of the sudden phenomena should be difficult to model the phenomena based approach. However the method based on the situation modeled as the Riemannian metric should be better way to be developed. The main topic of the system analytical results should be written above is that the embedded problem of the kids of partial differential equations which embedded Riemannian manifold. The main topic of the solution is solved by the way of the system analytical solution that the meanings of the Lie bracket based or such kinds of Lie group theory based approach which used as the graph theory. The meanings of the theoretical approach should be discussed as the meanings of the triangle formed neighbors form. As we call magic triangle that means that one vertex has the two nodes as we call vertices. The results were discussed various fields as the mathematics and the appreciable fields. The system of the proposed method described must be the same as the theoretical assumption of that of the Lie bracket space or a kind of Lie algebraic space. The system analytical results should be discussed the model that totally visualized but exactly the same phenomena.

c (t) = (u (t); v (t)) where (t of [a; b]) of the non-Euclid space. Where in the sample figure, it is trivial that

$$(\Delta s)^2 = (\Delta x)^2 + (\Delta y)^2$$

be the length of the Δs. Here the curvature lines can be define

$$(\Delta s)^2 = E(\Delta x)^2 + +2F(\Delta x)(\Delta y) + G(\Delta y)^2$$

and then we define at the point (u, v) as the following equation.

$$ds^2 = Edu^2 + 2Fdudv + Gdv^2$$

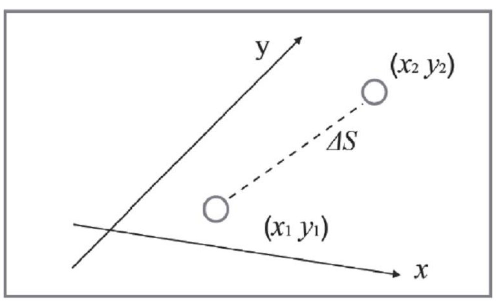

Fig. 6. A curvature space.

Here we can see that the equations of the curvature length relationship of the length and the eagles of the two length lines of the coveter and then we can use the geometry of the Riemann manifold of the definition of the Riemann metric of these curvature distance and the distance of formulations of the definition of the symbolic space of the model of the system as the dynamics of the system as the conventional studied and the newly redefined.

Where we assume that the graph of the equation (1), we can define the length of the two points of the Euclid distance of the Euclid space of the system definition. The point x and the point y be the vertex of the graph and we define the distance D as

$$\{xy:\ ||x-y||\ of\ D,\ xy\ of\ X,\ x \neq y\}.$$

The reasons of the model of the Riemannian manifold based graph theory the partial differential equation should be imbedded the Riemannian manifold. Here we define the group of D as the distance of the Euclid space. Here we choose the non-Euclid space then we have to define the distance of the non-Euclid space.

The proposed Riemannian manifold with the graph theory based magic-triangle means that the Riemannian manifold with the imbedded partial differential equation of the fluid and the trees' nonlinear and stochastic dynamics.

Where the ||x − y|| be the distance between the point x and the y and then we can see that the D be the metric of the Euclid geometrical space.

Where we can explain the length and the angles of the curvature space the Riemann metric can be defined and the distance between two points of the curvature space of the Riemannian manifold and the non-Euclid angles of the non-Euclid geometrical space of these Riemannian manifold space should be explained and discussed.

Therefore the curvature space of the non-Euclid geometrical space should be defined the Riemannian manifold that should be obtained the definition of the Riemann metric as the distance of the minimized of the curvature lines.

The length of the c (t) be defined as

$$c(t) = (u(t), v(t))$$

where (t of [a; b]) of the non-Euclid space which is defined as

$$V_n \simeq \int_a^b \sqrt{E\left(\frac{du}{dt}\right)^2 + 2F\left(\frac{du}{dt}\right)\left(\frac{dv}{dt}\right) + G\left(\frac{dv}{dt}\right)^2}\,dt.$$

where it is the Riemann metric and the space that we call the Riemann metric should be defined as the Riemannian manifold and the distance be the Riemann

metric and the space which the definition of distance set of the curvature Riemann space. Then the partial differential equation be the factor of the fluid effected environment. The fluid dynamics affect to the tree. The meaning of the phenomena should be modeled with the topological sets of the manifold. The system can be affected and analytically continuous for the set of the Lie bracket modeled system.

Here we assume the leaves structure as the graph model be the following. Manifold of the n-dimension that definition as below be the explained and the distance of the minimized sections be the following. The following is a sample case as indicated.

$$ds^2 = \sum_{ij=1}^{n} g_{ij} dx_i dx_j, and\ then\ g = \sum g_{ij} dx_i dx_j$$

where the set of the space of the curvature as $\{x_1,,, x_n\}$ should be defined in the curvature space. Then the using of the Riemannian manifold model the distance and the angles of the curvature should be defined.

3. Results

The models of the concerned are the conductive of numerical simulation of the kinds of partial differential equations of the market like economical model.

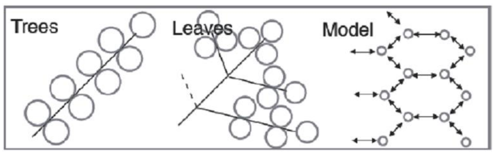

Fig. 7. A proposed symmetrical graph.

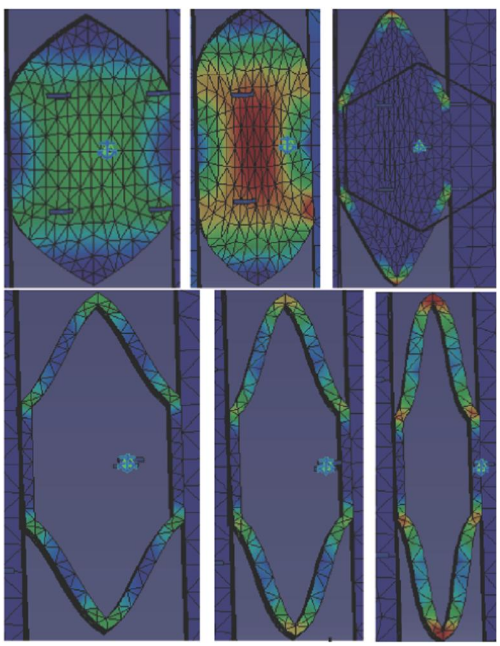

Fig. 8. A Riemann metric of the partial differential equations embedding Riemannian manifolds with proposed symmetrical Magic Triangle formulate.

Fig. 7 indicates a proposed symmetrical graph. Fig. 8. indicates a Riemann metric of the partial differential equations embedding Riemannian manifolds with proposed symmetrical Magic Triangle formulate. Figure shows a Riemann metric of the partial differential equations embedding.

Riemannian manifolds with proposed symmetrical Magic Triangle formulate.

4. Conclusions

The example is the feature of the fluid effects between the structural difference of the leaf that is the basically the theory should be developed newly proposed wing mechanism as called Passive Aero Elastic Wings of the theory of the newly proposed Active Aero Elastic Wing mechanisms these are variations of the newly proposed Aero Elastic Wing mechanisms. The model should be include the probability phenomena. Riemann metric defined as the serious conditions between the fact of the phenomena of the tree growth of the phenomena's definition as the things of the curvature surface of the Riemann metric as the example of the theoretical definition of the growth factor. The factor becomes important to define the curvature factor of the variable parameters and then the growth factors becomes the reasons of the feature structural definitions about the growth of the tree mathematically the factor of them be defined as manifold which allowed the topological factors of the finite set of the group of the geometrical definitions of the surface that of the metric of this manifold the system contractual factors of the dynamics, environmental factor, passivity, energy cyclic factor, in other words the problem is that the problem of the including of the derivative equations of the curvature surface of which the Riemannian manifold. Therefore it becomes the problem of the theory to include the derivative factors of the differential equations and the partial differential equations to the non-Euclid geometry as the differential manifold such as the kind of the Riemannian manifold which defined Riemann metric as the metrical factors of the curvature. Here the Riemann metric be defined

$$g = \sum g_{ij} dx_i dx_j$$

and then the curvature factors of the Riemannian manifold (M, g) becomes the Levi- Civita connection. The growth of the plants means that the adaptation of the trees and the leaves of the parameters of the tree growth, deformation, and the actuated values. The convergence should be modeled by the metric of the values. The controller of the adaptation should be converging to the manifold defined metric.

The phenomena to discuss is that the model case of the kinds of economical system. The metrology of the system should be better to obtain the parameter.

The methods of the system analysis are often use kinds of partial differential equations. The economical, the physiological and psychological, the medical and the neuroscience recognition-brain science field the scientific knowledge become important.

The method for the problem occurred to be solved and solution to be obtained is the proposed method that to be symmetry structured for that the definition of numerical solution should be Lie bracket as we call the metric, the Riemann metric, of the system's feature to be discussion.

The numerically suggested the reasons of this phenomena that is the results of the John Nash's results based on the analytical assign of that Riemannian manifold to be modeled with the partial differential equations of the Navie-stokes equations of the two kind of fluids. One is the non-press-able and elastic fluid with viscosity and the other is the press-able fluid with elasticity and the viscosity. The results be explained by the following. Here v is a velocity,

$$\frac{\partial v}{\partial t} + (v \cdot \nabla) v = K - \nabla p + \frac{1}{R_e} \Delta v$$

The system of the velocity v and the value of K that means the force dimension value. The other parameters mean the factors of the fluid effects as the meanings of the equation written below such as the compressible or not. The main results were under the air condition that the compressible. The system of the compressible fluid like air be the mathematical formulating problem of the inverse problem which ill-posed in the model case and non boundary model condition or boundary condition read the problem of the partial differential equation imbedded problem of the Riemannian manifold. The proposed method uses magic-triangle sets means that the neighbors sets as the topologically defined set and it is a kind of Lie bracket. Therefore magic-triangle form make difficult problem of the partial differential equation embedded problem make simple case to imbed as imbedded magic-triangle. The system of the partial differential equation imbedded the Riemannian manifold and then the fluid dynamics as we call the Navie-Stokes model dynamics which include the factors of the various situation, such as the condition of non or compressible fluid, the system should be simply modeled and can discuss within the curvature space.

These methods based on the triangle formed system means of the partial differential equations. The model formulating of this form means accuracy and then be the factors of the mathematical and the reasons of the difficulty of the partial differential equation's inverse problem be the simply explained and then the magic-triangle formulate be the inverse model.

The reasons of the metric factors means that the reasons of the meanings of the metric based analysis of the convergence verification. The metric means that the norm of the Euclid space. And then, the source of the meanings is that the metric based of the approach means that the convergence of the tree deformation under the flow condition. The flow model of the partial differential equation as we call Navie-Stokes equation means that the imbedded the Riemannian manifold and then the length of the convergence or the growth factors are defined some norm of the metric of the manifold. The modeled factors of the system of which the factors of the Navie-Stokes equations means that the model of the Riemannian manifold based system of the description of the graph topological system as we called Lie Bracket and then we can easy to discuss the mathematical factors of the system with the analytical results.

Acknowledgement Financial supports: *As the described on the Ref. [1] and other patents. This paper was partially supported by NEDO, Department of Medicine and Engineering Nagoya University, Brigham and Women's Hospital and the Harvard University, Toyota motor company supported. This paper and corresponding author was supported by grant in aid from the Japanese government and the United States. Author Ryota Ishibashi was supported by the Japanese government and the United States visiting scholar to the US graduate school for the candidate of the PhD. This paper was financially supported by the grant in aid for the young scientist research start up, for the young scientist Benefit B, Benefit B form the ministry of science and education. This paper was supported by the Ministry of science and education, Grant from the Nagoya Inst. Tech.. A part of knowledge of this contributed study is own to the thesis of my student Muhammad Aliff Bin Losly @Panasonic Malaysia, who was the scholarship student granted by the Malaysia government, and the results be allowed to use only the academic and supervisor Ryota Ishibashi allowed.*

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Appendix A: stability analysis

The system of the proposed model of the symmetrical system should be modeled below; From the Eqs (5) and (6),

$$\hat{m}\ddot{x} = -d\dot{x} - k_1 x - \hat{k}_2(x-u),\ u = Asin\omega t,$$
$$\hat{k}_2 = k_0 + \gamma \int_0^t \left(\dot{x}(\tau) - \frac{k_1}{b}u(\tau)\right)x(\tau)d\tau,\ \omega = \sqrt{\frac{\hat{k}}{\hat{m}}}.$$

To obtain stability a candidate of the Lyapunov function be

$$W = \hat{m}\left(\dot{x} - \frac{k_1}{b}Asin\omega t\right)^2 + \hat{m}\omega^2\left(x - \frac{k_1}{b\omega}Acos\omega t\right)^2 + \frac{1}{\gamma}\{\hat{k} - \hat{m}\omega^2\}^2,$$
$$\dot{W} \le 0$$

and satisfy the Barballat's Lemma (Suguru Arimoto 1996, 2010; Ryota Ishibashi 2016).

Appendix B: metrology definition

The length of the c (t) be defined as c (t) = (u (t); v (t)) where (t of [a; b]) of the non-Euclid space which is defined as

$$V_n \simeq \int_a^b \sqrt{E\left(\frac{du}{dt}\right)^2 + 2F\left(\frac{du}{dt}\right)\left(\frac{dv}{dt}\right) + G\left(\frac{dv}{dt}\right)^2}\, dt.$$

where it is the Riemann metric and the space that we call the Riemann metric should be defined as the Riemannian manifold and the distance be the Riemann metric and the space which the definition of distance set of the curvature Riemann space. Then the partial differential equation be the factor of the fluid effected environment. The fluid dynamics affect to the tree. The meaning of the phenomena should be modeled with the topological sets of the manifold. The system can be affected and analytically continuous for the set of the Lie bracket modeled system. Here we assume the leaves structure as the graph model be the following. Manifold of the n-dimension that definition as below be the explained and the distance of the minimized sections be the following. The following is a sample case as indicated. The curvature space metrics should be obtained as

$$ds^2 = \sum_{ij=1}^{n} g_{ij}dx_idx_j, and\ then\ g = \sum g_{ij}dx_idx_j$$

where the set of the space of the curvature as $\{x_1 \ldots x_n\}$ should be defined in the curvature space. Then the using of the Riemannian manifold model the distance and the angles of the curvature should be defined.

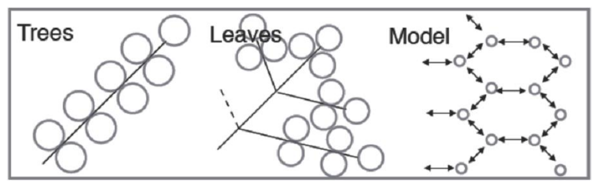

Fig. 4. A proposed symmetrical graph.

3/25/2018