Advances in Mathematics: Scientific Journal **10** (2021), no.5, 2419–2431
ISSN: 1857-8365 (printed); 1857-8438 (electronic)
https://doi.org/10.37418/amsj.10.5.10

NONLINEAR STRUCTURAL ESTIMATION OF LOCALIZED NETWORK USING HOMOTOPHIC TOPOLOGICAL (2(N)+1) DIMENSIONAL FOR DISTANCE THEORY (HTD-DT)

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ABSTRACT. A Nonlinear Structural Equation Model (NLSEM) is formed on the basis of various dimension in normal mutual estimation depending on Distance Estimation Theory (DET) and its complex networks structure. The homotophy linear topography analyze the dimension of formal network in hidden paths to consider the linear structure. However, dimension theory is a linear dependence between the variables for observation is problem in nature of distance estimation along the node and these approaches have limitations to form shortest communication. This paper proposes the Nonlinear structural estimation of localized network using homotphic topological (2 (n)+1) dimensional for distance theory Structure equation model based on the Probability distribution theory of evaluation model (PDTE) that compensates for the potential innumerable dependencies between network points. For this unstructural reason, network densities are provided to take advantage of the lower specific margins of density that are present in most real-world networks. The Gambier IV order ($y\frac{d^2y}{dt^2}(\alpha, \beta)$, complex constant) is used to optimize the Painleve I order ($X' = X'^{(dy/dt)}y^2 + t$) equation to derive the neighborhood singularities to estimate the distance. This computational provides an efficient integration to the diagonal gradient algorithm has been developed to estimate the SEM coefficients of polymorphic formation and therefore infer the edge structures on distance estimation. Preliminary testing of simulated data demonstrates the effectiveness of the new approach produce high estimation with lower redundancy steps of mathematical solvation.

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2020 *Mathematics Subject Classification.* 68M15.

Key words and phrases. Nonlinear equation, homotophy, network topology, probability distribution theory, gambier equation, painleve model.

Submitted: 25.03.2021; *Accepted:* 05.04.2021; *Published:* 07.05.2021.

1. INTRODUCTION

We establish an analytical method leading to a more general form of the exact solution of a nonlinear ODE of the second order due to Gambier. The treatment is based on the introduction and determination of a new function, by means of which the solution of the original equation is expressed. This treatment is applied to another nonlinear equation, subjected to the same general class as that of Gambier, by constructing step by step an appropriate analytical technique.

Generally, when a system is modeled by an ordinary differential equation (ODE) it is done in such a way that the corresponding ODE describes the change with respect to time (the independent variable) of some dependent variable; and the solution of the equation represents the state of the system at that point in time. This enables us to predict its future behavior of network distance theory. Indeed this ability to predict the evolution of system is of fundamental importance and is the primary reason for their unique status. Many of the mathematical models used for understanding physical, chemical, engineering, or biological processes are described by nonlinear ordinary differential equations and their widespread network applicability to the sciences has generated in its trail a continuous stream of several new problems of both theoretical and practical interest. Consequently, it is a worthwhile endeavor to engage in an investigation of their properties and distinctive features

The developed procedure yields a general exact closed form solution of this equation, valid for specific values of the parameters involved and containing two arbitrary (free) parameters evaluated by the relevant initial conditions. We finally verify this technique by applying it to two specific sets of parameter values of the equation under consideration in network topology.

2. RELATED WORK

We have included the Painleve-Gambia taxonomy Some non-linear second order uses the Lee-Tresse summation method to align the simple derivative equations with the straight line of point shifts. The basis of these point transitions are configured using the Lee point symmetry generator which is recognized by the Painleve, Gambiar equation. It has some lee point symmetry, so it has been proven that this method allows the non-linearization Painleve and Gambier equations to be integrated by being perpendicular. Furthermore, using the partial Lagrange approach, we obtain the time-dependent and time-independent first integrations of these Painleve and Gambier equations, which have not been previously reported in the literature..

The technical advantage of this is that the classical (ie, soft) odes often have a distribution theory that requires weak limits, even when compared to PTE. This means that the solution can work properly within limits. However, I would like to stay in a solution surrounded by a rule of thumb for another rule of ODE, but for a finite amount of time (a rough PDE with infinite dimensions boundaries was its beginning) it would blow up the exhibition with highdimensional ODE.

In fact, quantitative studies such as mass, energy, momentum, etc. explore the world of PTE so the ODE model helps to clarify many of the events we need to do because the petty world is in a state of emptiness.

One of the key features of route identification is its trend sensitivity to initial conditions. This means that the nodes close to each other in place to build at a certain initial point to differ in a small mean time time exponentially in two ways. Due to the boundary dimensions of the gravitational field, the two orbits within it cannot differ indefinitely at the same time. Phase orbits can be estimated using the Rapid Deviation-Increment Riapnov layer. To find non-linear dynamic algorithms for netwoks, we need to calculate the maximum Riapnov layer. From a practical point of view it is important to have a Riapnov index that is unchanged but can be calculated on the basis of a series of times obtained by experiment.

- Complex identification in nonlinear second order structural network distance estimation leads complex nature in localized network environment.
- Probability increasing on unstructured dimension leads multivariable topological construction increased to form complex structure.
- Increasing constructed variables forms transcendent distance (Painleve -unordered structure) appear in random points in singular matrix leads more mitigation

3. Homotophic Topological (2(n)+1) Dimensional For Distance Theory

The main objective is to reduce the mathematical conservation of Nonlinear second-order ordinary differential equations in the complex plane of network structure. To formalize the structural transformation of the dependent and independent variables (Dimensional theory) of a differential equation that transforms it to a similar equation. To design a homotophy topologic structure (HTS) using on Distance Estimation Theory formulation to reduce nonlinear structural communication in complex networks. To creating a singularized network structure based on Re-Hil variable transformation in second order differential equation.

Definition 3.1. ***Painleve second order equation.*** *Differential equation of second order with the Painleve property is reduced to one of the six Painleve equations P_I, P_{II}, P_{VI} unless it can be integrated algebraically, or transformed into a simpler equation such as the linear differential equations or the differential equations of the elliptic functions. Generic solutions of α, β the Painleve equations are known to be very transcendental*

$$\begin{aligned}
P_{\mathrm{I}} :& y'' = 6y^2 + t \\
P_{\mathrm{II}} :& y'' = 2y^3 + ty + \alpha \\
P_{\mathrm{III}} :& y'' = \frac{1}{y}\left(y'\right)^2 - \frac{1}{t}y' + \frac{1}{t}\left(\alpha y^2 + \beta\right) + \gamma y^3 + \frac{\delta}{y} \\
P_{\mathrm{IV}} :& y'' = \frac{1}{2y}\left(y'\right)^2 + \frac{3}{2}y^3 + 4ty^2 + 2\left(t^2 - \alpha\right)y + \frac{\beta}{y} \\
P_{\mathrm{V}} :& y'' = \left(\frac{1}{2y} + \frac{1}{y-1}\right)\left(y'\right)^2 - \frac{1}{t}y' \\
& + \frac{(y-1)^2}{t^2}\left(\alpha y + \frac{\beta}{y}\right) + \frac{\gamma}{t}y + \delta\frac{y(y+1)}{y-1}
\end{aligned}$$

$$\begin{aligned}
P_{\mathrm{VI}} : \quad y'' =& \frac{1}{2}\left(\frac{1}{y} + \frac{1}{y-1} + \frac{1}{y-t}\right)\left(y'\right)^2 - \left(\frac{1}{t} + \frac{1}{t-1} + \frac{1}{y-t}\right)y' \\
& + \frac{y(y-1)(y-t)}{t^2(t-1)^2}\left(\alpha + \beta\frac{t}{y^2} + \gamma\frac{t-1}{(y-1)^2} + \delta\frac{t(t-1)}{(y-t)^2}\right)
\end{aligned}$$

Definition 3.2. ***Gambier analytical equation.*** *Let us developing the theory of second-order differential equations:*

$$(y^2-y)y''_{xx}-q(x)(y^2-y)y'_x-\frac{3}{4}(2y-1)y'^2_x=0, q\ artbitrary.$$

The above equation is due to B. Gambier; and the solution is obtained by means of the transformation $y(x) = h[\xi(x)]$, where $\xi(x)$ is a solution of the equation $\xi''_{xx} = q(x)\xi'_x$. Successive integrations of the latter equation furnishe

$$\xi(x)=\bar{c_1}\int e^{\int q(x)dx}dx+\bar{c_2},$$

with c_1, c_2 being integration constants (we can perfectly take the values 1 and 0 for c_1 and c_2, resp.). Thus, by differentiating twice the node be checked.

4. Preliminaries nonlinear network construction theory

Definition 4.1. *Open queuing network constructs in the form of nonlinear distance theory of the evaluation, when the network in the open queue becomes constant, the speed of all tasks left by the node, the sum, is equal to that of all the tasks in the reserve coming to the node*

$$\left[\lambda_(i)+\sum_{i}^{m}\mu_i\right]p(k)=\sum_{i=1}^{m}\lambda_e p(k-I_i)+\sum_{i=1}^{m}P_{id}\lambda_i p(k+I_i)+\sum_{i=1}^{m}\sum_{j=1}^{m}p_k i\lambda_k p(k+I_i-I_j).$$

Join the probability that p (k) is the constant state k can be here, the unit change of the terminal from i I to the unit vector I and J states.

Definition 4.2. *Delay sorting is generated over the network broadcast on the WSN line with a queuing delay (wait delay) for each line. The transmission delay is linked to the packet arrival rate and the service speed of the terminal. The application of the terminal I is given by the following equation $\rho_i = \frac{\lambda_i}{\mu_i}$.*

End-to-end delays caused by M/M/1 queueing models of the N-level nodes are explained:

$$E(T)=\sum_{i=1}^{N}\frac{1}{\mu_i-\lambda_i}=\sum_{i=1}^{N}\frac{1\mu_i}{1-\rho_i}.$$

5. Distance theory estimation

Definition 5.1. *In the queuing network for wireless sensor networks, each node is considered as an M/M/1 queue, and each path is considered as a queuing model with N-level serial nodes, service rate μ, the average task arrival rate λ and pure packet arrival rate γ of entering the queueing network. The average number E (kn) of tasks in the path m equals the sum of servicing and queueing packets. E (kn) can be obtained through*

$$E(k_n) = \lambda_n T_n = \frac{\lambda_n}{\mu_n - \lambda_n}.$$

The average number of packets in a queueing network path can be obtained

$$E(k) = \sum_{n=1}^{m} E(k_n).$$

The relationship between the average delay and the average number E (k) of tasks in a queueing network can be described as follows:

$$\gamma E(T) = E(k).$$

The average network delay with M paths can be obtained

$$E_m(T) = \frac{1}{\gamma}\sum_{n=1}^{m} \lambda_n T_n = \frac{1}{\gamma}\sum_{n=1}^{m} \frac{\lambda_n}{\mu_n - \lambda_n}.$$

We can calculate the average network delay of the sub-queuing network in WSNs.

6. Observing joint probability distribution

Joint probability distribution function considers the Inner and outer coverage of node response in independent at (x, y) is given by $f(x,y) = e^{-(x+y)}, 0 < x, y < \infty$ as x and y are independent because of joint 2(n)+1 node remains the outer coverage response mean and variance of node movement time.

By squaring the values because of mean distribution,

$$f(x,y) = kxye^{-(x^2+y^2)}, x > 0 \text{ similar } y > 0.$$

By integrating the node resembles time of representation,

$$\int_0^\infty \int_0^\infty f(x,y)dxdy = 1.$$

Derive at f(x, y) as dxdy function,

$$\int_0^\infty \int_0^\infty kxye^{-(x^2+y^2)}dxdy = 1.$$

We split the coverage region of nodes at K arbitrary point

$$k\left[\int_0^\infty xe^{-x^2}dx\right]\left[\int_0^\infty ye^{-y^2}dy\right] = 1 \text{ in equivalent } \frac{k}{4} = 1.$$

Condition at k=4 remains same, i.e., $f(x,y) = 4xye^{-(x^2+y^2)}$ be the joint distribution. Let he consideration of x and y at independent data state, ie, f(x, y) =f(x), f(y). The marginal density of node across the region at function x be defend as, $f(x) = \int_0^\infty f(x,y)dy \rightarrow$ Derived from geometric distribution, $4xe^{-x^2}$ as follows, $4xe^{-x^2}[\int_0^\infty ye^{-y^2}dy]$ which is equivalent to, $f(x) = 2xe^{-x^2} \approx f(y) = 2ye^{-y^2}$, i.e., x carries the n nodes $(2n+1) \approx 1$, so x and y are independent in the form of 2n+1 nodes covers in the communication region.

To find the correlation between the two nodes form karl pearsons coefficient which distributed at coverage region obtained by the definition, $r(x,y) = r_xy = \frac{cor(x,y)}{\alpha_x * \alpha_y}$. Here $cor(x,y) = \mu(xy) - \mu(x) * \mu(y) \approx \bar{XY} - \bar{X} * \bar{Y}$ and equivalent forums,

$$\bar{X} = \frac{\sum x}{n}, \quad \bar{Y} = \frac{\sum y}{n}, \quad \bar{XY} = \frac{\sum xy}{n},$$

$\alpha_x = \sqrt{var(x)}$, $\alpha_y = \sqrt{var(y)}$.

Be variant at the n number of nodes X and Y, $x = \alpha_x = \sqrt{\frac{\sum x^2}{n} - (\bar{x})^2}$ and $y = \alpha_y = \sqrt{\frac{\sum y^2}{n} - (\bar{y})^2}$.

Proof. Let us consider the node traverse at any point with random nonlinear partial differential order at the position of dynamic nodes moves between x and y at f(x, y) independent arrangement:

$$f(x) = \begin{cases} x, 0 \geq 75 \leq 50 \approx \sum(x), \\ y, 0 \geq 75 \leq 50 \approx \sum(y). \end{cases}$$

at n=8 at k arbitrary position begin at 5 variants nodes.

We get x and y independent variables of nodes $\mu(x) = \bar{X} = \frac{\sum x}{n} = \frac{544}{8} = 68$, $\mu(y) = \bar{y} = \frac{\sum y}{n} = \frac{552}{8} = 69$, remains the same $\mu(xy) = \bar{XY} = \frac{\sum xy}{n} = \frac{27566}{8} = 4695$.

TABLE 1. Simulation parameters for constructing topology

Parameters and consideration	Processed values
Simulation environment	NS2
Number of nodes	100
Routing protocol	AODV, UDP/TCP
Type of Mac Protocol	802.11 Ext
Coverage (N+1 transmission)	100Sq.m
Transmission data mode	Data packet 512 mb

To resolve this $x = \alpha_x = \sqrt{\frac{\sum x^2}{n} - (\bar{x})^2)} = \sqrt{\frac{37028}{5} - (68)^2} = 2.121$ as follews y at $\alpha_y = \sqrt{\frac{\sum y^2}{n} - (\bar{y})^2} = \sqrt{\frac{38132}{5} - (69)^2} = 2.345$ equalized to find the correlation among the nodes at moment $cor(x, y) = \mu(xy) - \mu(x) * \mu(y) \to cor(x, y) = 4695 - 68 * 69 = 3$. To find the coefficient $r(x, y) = r_{xy} = \frac{cor(x,y)}{\alpha_x * \alpha_y} = \frac{3}{(1.1.21)(2.345)} = 0.6032$. □

7. RESULT AND DISCUSSION

The nonlinear estimation be estimated with network simulator (NS2) version of the proposed process for creating simulated systems by resolving the mathematical solvation. Consider various simulated parameters of the proposed network approach behavior is tabulated. In the replication prototypical, the tool creates the nodes moving from source point to destination data process can be done using the Tool Command Language (TCL) script. Table 1 show the parameters and values processed in the simulation environment the simulation scenario. The number of nodes that are constructed with transmission type. The parameters that considers to process the simulation results that evaluated below

7.1. **Analysis of throughput average communication.** Communication routing process output is the sum of the data obtained from the source defined at the mean time divided by the node arrival time it takes to get to the last packet first.

Throughput = Average number of data transfer at packet flow/ mean transfer time.

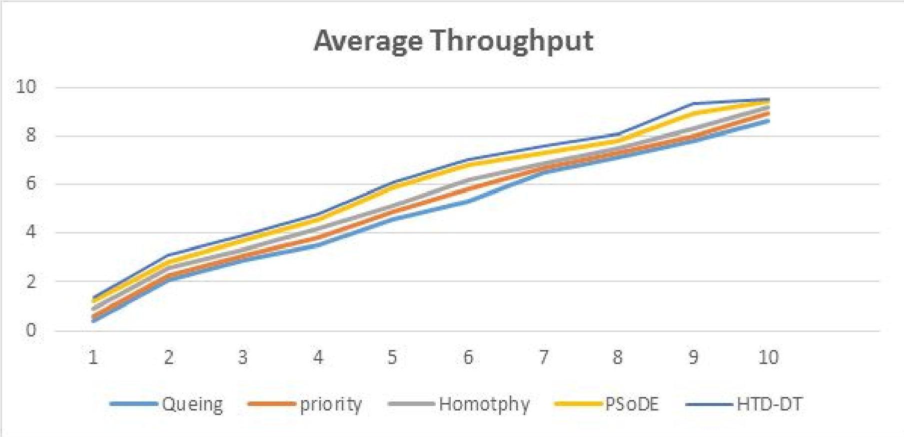

Figure 3 shows the throughput performance of communication time process from source to destination at the response routing path. The proposed system proves the bets through put performance as well than other methods have been at improved strategy.

7.2. **Cooperative Links at transmiison rate.** The transmission rate continues to describe the proportional change of the transfer packets in the opportunity structure. The target node now selects a reliable node for the remaining contin-uoes which its increase energy to maintaing the cooerative rate that considering the parameters.

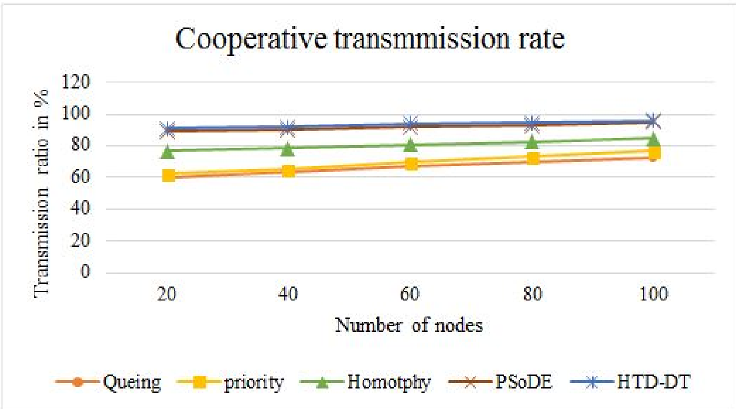

Figure 4 shows the transmission rate as it sends the data with the source nodes of the path they choose with nearest neighbor. Node response the routing

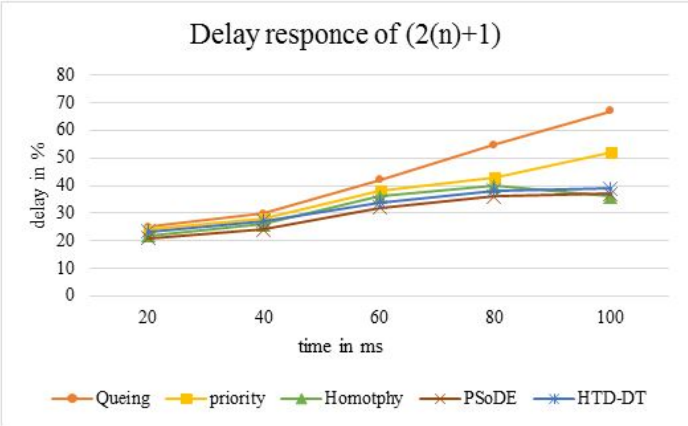

Figure 5. End to End Delay

beginning with Source Node Updated the path of simultaneous transfer path selecting the optimal speed packing for the transfer of pheromone values depending (n+1) remains (n-2) . Send all packages to selected optimal path locations to improve source capacity energy in wireless transmission.

7.3. **Impact of Delay response.** The delay response means the 2(n)+1 strategy, but over time it takes the network out of one one ode remains farther with another coverage region. The end-to-end deferred data arrives from the target source from mean estimation queuing and reaches the required time way from the coverage region.

Delay=Arrival time - Sent time / Total number of connections and it's the Average Delay= Total Delay / Total number of packets received.

The communication proves the delay response of (n-1) node at in network stargey which is increase the data transfer as a result of space in routing path and total energy consumption as they are received per event in single iteration. The energy required for an emotional event is usually constant and uncontrollable in nonlinear type of equation. Therefore, as the (n-1) dominant component in maintaining communication systems over energy reduces the delay timing of the networks can be used to prolong energy consumption.

7.4. **Dynamic node link stability at n+1 state.** The dynamic network delay occurs is expected from the sensor nodes be response to maximum time of evaluation to maintain the link stability to improve the system. The communication verifies the maximum response node at in maximum dynamic range to the transmission increases and the solution over the network increases the life of the packet transfer protocol in an advanced optimized delay mode based on these system parameter results.

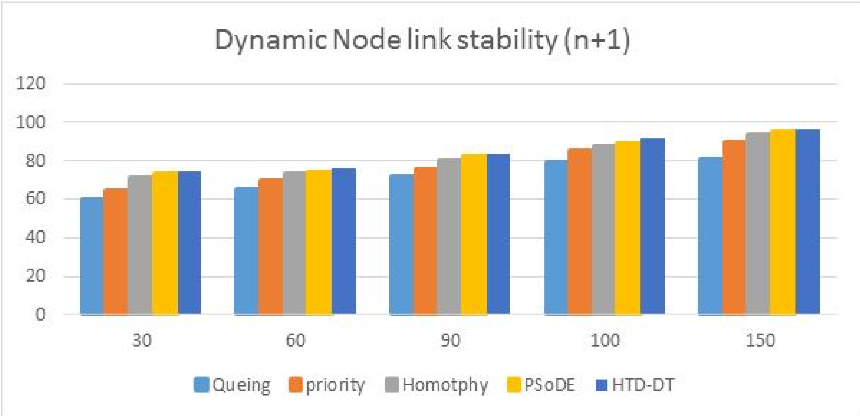

Figure 6: Dynamic node link stability at n+1

Figure 6 shows the dynamic node that response in nearest coverage region NïČă2(N) +1contain maximum link stability. The proposed solution proves efficiency of the sensor network life-extending node stability connection in nonlinear communication network. By adding a sleep node to the event of variant remains (2+1) be neglected, the sensor terminal can significantly reduce power consumption to maximize the node response.

8. Conclusion

To conclude this Nonlinear homoptophy append this Equation Integrity The Painleve study of mathematical process at in infinite PDEs. First uses the infinite equation to illustrate the characteristic network: The solution can be a single value function with a single value general function of data with an independent variable in any singular extension. Of course, if a Painleve property is considered an abbreviated property, we may give an explanation of one of them. The Panleve property should be used as an indicator of the integrality of a non-homogeneous equation, a test result that is valid for that definition. This proposed system proves the distance theory estimation in the form of redundant mathematical process of evaluation.

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