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On the Stability, Optimization, Control and Neural Networks of Complex Systems - Cognitive analysis of high-order calculus equations and pattern recognition in the "0 to 1"

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Abstract: The concept of "group combination-circular logarithm" for stability, optimization, control and neural network of complex multi-body systems is proposed. It satisfies infinite arbitrary finite multivariate element-cluster group combinations, integrates the two mathematical fields of traditional calculus and pattern recognition, and has the characteristics of closure, multi-system, multi-parameter, heterogeneity, covariance, unit probability, and isomorphism. Topological, center-zero symmetry and other characteristics, optimize the composition of novel high-order calculus equations "without derivatives, limits, and logical symbols", and map them to controllable "irrelevant mathematical models, no specific calculation element content" circular logarithmic neural network ,In {0:[0 to (1/2) to 1]:1} zero error arithmetic logic cognition and parsing. Attached are experimental explanations and examples of numerical calculation of quintic calculus equations in one variable.

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1. Preface

For hundreds of years, calculus has a colorful history of development and a bizarre prehistory. From finite to infinite, from discreteness to continuity, from superficial appearance to profound essence. From Newton, Leibniz, Bernoulli, Euler, Cauchy, Riemann, and finally to Lebesgue, the systematic establishment of calculus is completed, which is called traditional calculus. Traditional calculus encountered the difficulty of multi-body complex system, the emergence of high-order calculus order value-recognition-analysis, as well as optimization and control.

In the 1940s, category theory provided a formalized logical language for expressing and solving problems in complex scientific fields, and describing the interaction between objects became the theoretical basis for discrete computers. Chinese mathematician Xu Lizhi's "Selected Lectures on Mathematical Methodology", Wu Xuemou's "Pan-system Theory and Mathematical Methods", Zhong Yixin's "Paradigm Revolution: The Only Way to Innovate the Source of Artificial Intelligence Theory", etc., proposed novel mathematical methods and logical paradigms, deepening artificial intelligence logic theory.

In August 2021, British scientist Brett Kagan published an experiment called "Cyber Brain", which proved that "using the dish-shaped brain system, the single-layer cerebral cortical neurons cultivated can automatically participate in the simulated game world. Organizing and exhibiting intelligent, sentient behavior", whose ability to transmit and control information far exceeds current mathematical models. This experiment shows the close connection between brain consciousness and efficient mathematical models, which means that humans will face new challenges in tracking unknown variables.

Here, the concept of "multi-variable" called group combination is proposed to expand the traditional calculus "single variable" into a complex multi-body system, and the "multiplication and addition reciprocity rule" based on mathematics is discovered for the first time, and the mean function and discriminant of group combination are established. For the key problem of group combination invariant group stability, the calculus element-pattern recognition clustering set is successfully optimized into a unified novel high-order calculus equation, which is mapped to an unrelated mathematical model, which is calculated and controllable without specific element content. Neural network circular logarithm, realizes the cognition and analysis of zero-error arithmetic logic in the interval of {0:[0 to (1/2) to 1]:1}. It is called "group combination-circular logarithm".

2. Basic definition and theorem of circular logarithm

There are many names similar to "circular logarithm" in the history of mathematics, including: Veda's theorem, least squares, least action principle, error approximation, distance, measure, geodesics, information transmission principle, Einstein's theory of relativity, Lebesgue elliptic function , Neural Networks, Circles, …. Almost all function analysis is inseparable from the mathematical principles of these "circles".

So far, no one has found that this is the "reciprocity of two associative asymmetric groups (functions, spaces, numerical values, group theory)" rule for any function. In fact, it is the reciprocal relationship between "multiplication and addition" or polynomial "root and coefficient" based on mathematics, and is the foundation of stability, optimization, control, and neural network recognition and analysis of complex multi-body systems.

2.1. Basic Definition

Definition 2.1: System: Refers to the interaction of infinite elements-clusters in a multi-body system, multi-region, multi-parameter, multi-heterogeneity, forming an infinite program "continuous and discontinuous, symmetric and asymmetric, sparse and dense, fractal and chaotic". …". The elements of infinite calculus equation and the clustering of pattern recognition are expressed as $[S]=[S±Q±M]$. Infinitely many systems, multi-regions and other complex systems. The combinations are not repeated, and the sets form a polynomial higher-order calculus equation $\{X\}^{K(Z±S±Q±M±(N)±(q))}$.

$$\{X\}^{K(Z±S±Q±M)/t}=\{X\}^{K(Z±[S]±(N)±(q))/t}$$
$$=[\sum_{(Z±[S]±q)}\{X^S,X^Q,X^M\},\prod_{(Z±[S]±q)}\{X^S,X^Q,X^M\}]/t$$
$$=(1-\eta^2)^K\{X_0\}^{K(Z±[S]±(N)±(q))/t};$$

$$(1-\eta^2)^K=[{}^{[S]}\sqrt{\prod\{X^S,X^Q,X^M\}}/[\sum(1/[S])\{X^S+X^Q+X^M\}]^K$$
$$=\{0:(0\leftrightarrow(1/2)\leftrightarrow1):1\}^{K(Z±[S]±(N)±(q))/t};$$

Definition 2.2 Group combination: any finite element-cluster group combination in infinity. According to Euler's product formula, these group combination elements are combined by continuous multiplication and continuous addition without repetition, and they are assembled into mathematical models such as the structure, energy, and behavior of calculus equations. Among them: S system $\{X^S\}=\{x_1x_2\cdots x_S\}$; Q system $\{X^Q\}=\{x_1x_2\cdots x_Q\}$; M system: $\{X^M\}=\{x_1x_2\cdots x_M\};\cdots$; the composition becomes complex multi-body, multi-level The interaction of the system $[S]=[S,Q,M\cdots]$ is called group combination.

Definition 2.3 Element-cluster: Element-cluster is an invariant group with multiple parameters $\{x\}^{K(Z±S±Q±M)}=\{x_j\omega_iR_k\}^{K(Z±S±Q±M)}$; where the weights Parameter $\{\omega_i\}=({}_{\alpha}\omega_{\beta}\omega_{\gamma}\cdots)$; Heterogeneity (distance) parameter $\{R_K\}=(r_{\alpha}r_{\beta}r_{\gamma}\cdots)$;

(1) High parallel discrete group combination element-cluster combination, which means jumping transition between group combinations.

$$\{X\}^{K(Z±[S]±(N)±(q))/t}$$
$$=\sum_{(Z±[S]±q)}\{X^S,X^Q,X^M\}[\prod_{(Z±[S]±q)}\{X^S,X^Q,X^M\}]/t$$
$$=(1-\eta^2)^K\{X_0\}^{K(Z±[S]±(N)±(q))/t};$$
$$(1-\eta^2)^K=\{0 \text{ or } 1\}^{K(Z±[S]±(N)±(q))/t};$$

(2), High serial entanglement type group combination element-cluster combination, indicating a smooth transition within the group combination.

$$\{X\}^{K(Z±[S]±(N)±(q))/t}$$
$$=\prod_{(Z±[S]±q)}\{X^S,X^Q,X^M\}[\sum_{(Z±[S]±q)}\{X^S,X^Q,X^M\}]/t$$
$$=(1-\eta^2)^K\{X_0\}^{K(Z±[S]±(N)±(q))/t};$$
$$(1-\eta^2)^K=[\{0\leftrightarrow(1/2)\leftrightarrow1\}\text{or}\{-1\leftrightarrow(0)\leftrightarrow+1\}]^{K(Z±[S]±(N)±(q))/t};$$

Definition 2.4 Element-cluster mean function (positive, medium and inverse eigenmodes, $(K=-1,±0±1,-1)$

The mean function is the entry point of higher-order calculus equations, and the single variable is not suitable for the concept of clustering, the combination element of the multi-body system group.

$$\{X_0\}^{K(Z±[S]±(N)±(q)/t}$$
$$=\{X_0\}^{K(Z±[S]±(N)±(q=0)/t}+\{X_0\}^{K(Z±[S]±(N)±(q=1)/t}+\{X_0\}^{K(Z±[S]±(N)±(q=2)/t}+\cdots+\{X_0\}^{K(Z±[S]±(N)±(q=0,1,2,3\cdots P)/t}$$
$$=\sum_{(Z±[S])}\{(1/C_{([S]±N±q)})^K[\prod_{(Z±[S]±q)}\{X\}^K+\cdots]\}^{K(Z±[S]±(N)±(q=0,1,2,3\cdots P)/t};$$

Complex form element-cluster combination: The logarithm of the circle in the form of a coding tree corresponds to the eigenmode expansion of each level.

$$\{X\}^{K(Z±S±Q±M)}=(1-\eta^2)^K\{X_0\}^{K(Z±[S]±(N)±(q)/t};$$

In the formula: the combination coefficient$(1/C_{(Z±[S]±(N)±(q))})^K$ is any finite element-cluster combination, which satisfies the Yang Hui-Pascal triangular distribution regularization rule. The original traditional combination coefficient is written as C^n_m, and the function is unchanged now, expanding the scope of application.

Definition 2.5 Discriminant:

The system that satisfies the discriminant condition of the closed-combination multiplication and addition reciprocity rule has stability, can be optimized, and can be controlled.

$$(1-\eta^2)^{K(Z±[S]±(N)±(q))}$$
$$=[{}^{[S]}\sqrt{\prod\{X^S,X^Q,X^M\}}/[\sum(1/[S])\{X^S+X^Q+X^M\}]^K$$
$$=[\{{}^{S}\sqrt{X}/X_0\}]^{K(Z±[S]±(N)±(q))}\leq\{1\}^K;$$

Definition 2.6 Time series: The base of the invariant group unit is composed of integer time series, exponential function, power function, path integral and other functions. The time series $K(Z)/t$ controls the depth and breadth of the multivariate (function, space, value, group) of complex systems and its structure, state, and behavior. Integer expansion of time series and power functions:

$K(Z)/t=K(Z\pm[S]=[S+Q+M]\pm(N)+(q=0,1,2,3\cdots))/t$
$=\{^{S}\sqrt{X}\}^{K(Z\pm[S]\pm(N)-(q=0,1,2,3\cdots)/t}/\{^{S}\sqrt{X}\}^{K(Z\pm[S]\pm(N)\pm(q=0)/t}$
$=\{X_0\}^{K(Z\pm[S]\pm(N)-(q=0,1,2,3\cdots)/t}/\{X_0\}^{K(Z\pm[S]\pm(N)\pm(q=1)/t}$;

The integer expansion of time series and power functions calls the integer theorem involved in "Hodge's conjecture". "That is, any algebraic cluster can be increased or decreased by a simple integer (algebraic cluster bonding)", and the invariant group unit is used to satisfy the integer zero-error expansion.

Definition 2.7 Optimality: The equations in the system that satisfy the relative symmetry of stability are optimized to be uniformly simple, with probability

- Topological logarithms of circles. The circular logarithm has the functions of combination, transformation and decomposition of inverse and inverse.

Definition 2.8 Controllability: All group combination elements-set classes in the system can be encoded in a tree-like form, satisfying stability

Performance and optimization of calculus equations, arithmetic logic computations with zero error between circular logarithms $\{0 \text{ to } 1\}^K$ in a controllable neural network.

In the formula: equation function property K=(+1 (convergence), ±1 (balance) ±0(transformation), -1 (expansion)), infinite element (Z), any finite element in the system [S]=[S,Q,M⋯,], calculus order(±N) integral (+1) differential (-1), P term order, element combination form $(q=0,1,2,3\cdots n\le[S])$, time (/t), time and calculus orders and element combinations unfold simultaneously.$(1/C_{([S]\pm N\pm q)})^K$ regularization combination coefficient. The superscript is the system, area, level and combination form of the element combination, and the subscript is the location of the element combination (the same below).

2.2. Fundamental theorem

In 1975, Berman-Hartmanis found that there is a pair of G(•) and F(•), which has the asymmetric reciprocal relationship of full-rank mapping, so that $f^{(+1)}$ and $f^{(-1)}$ are both polynomial isomorphic time computable The problem. Mathematicians call it the "reciprocity theorem" which is the "yeast" of all theorems, indicating that other theorems are derived from this reciprocity theorem.

Mathematicians put forward the proof requirements:

(1), isomorphism of closure and reciprocity is relatively symmetrical;

(2), irrelevant mathematical model;

(3), no specific element calculation content;

(4), limited to arithmetic "addition and subtraction" There are six symbols for multiplying, dividing, exponentiation, and square root, and carrying out the algorithm of "logicalization of arithmetic calculation, arithmeticalization of logical calculation".

[Proof 1]: Reciprocity Theorem

Let: the system selects any finite $K(Z\pm[S]\pm q)/t$ (unit invariant group) in the infinite element product as infinite element-clustering:

$\{X\}^{K[S]}=\{\prod(x_1x_2 \cdots x_S)\}=\{^{K[S]}\sqrt{X}\}^{(S)}$ or $\{X\}^{K[S]}=\{\sum(x_1+x_2+\cdots+x_S)\}^K$

are the corresponding group combinations, and the regularization combination coefficients are introduced to become "mean values" respectively. function" invariant group unit.

Define the stability discriminant:

$(1-\eta^2)^K=(^{K[S]}\sqrt{X/X_0})^{K(Z\pm[S]\pm(q=n)/t}\le1$; $n=0,1,2,3=(P-1)$, P is the item order.

Define the first eigenmode (multiply) unit body, the combination of the continuous multiplication square root of all elements of the group combination function:

$$dx=\{X_0\}^{K(Z\pm[S]\pm(q=0)/t}=\{(^{KS}\sqrt{\prod}_{(i=S\pm q)}(x_1x_2x_q\cdots)\}^K=\{^{K[S]}\sqrt{X}\}^{K(Z\pm[S]\pm(N=-1)\pm(q=1)/t}=\{X\}^{K(1)}$$

Define the second eigenmodulus (multiply-add) unit body, the continuous-add mean combination of all elements of the group combination function:

$$dx=\{X_0\}^{K(Z\pm[S]\pm(q=1)/t}=\{(1/S)^K(x_1^K+x_2^K\ldots x_q^K\ldots)\}^{K(Z\pm[S]\pm(N=-1)\pm(q=1)/t}=\{X\}^{K(1)};$$

Define the relationship between the group combination invariant group $(^{K[S]}\sqrt{X})$and the mean function $\{X_0\}$: (n=(p-1),(n+1)=(S-0))

$$\{X\}^{K(Z\pm[S]\pm(q=n)/t}$$
$$=\sum_{(Z\pm S)}\{(1/C_{([S]\pm N\pm q)}[\prod_{(Z\pm[S]\pm q)}\{x\}^K+\cdots]\}^{K(Z\pm[S]\pm(q=n)/t}$$
$$=\sum_{(Z\pm[S]\pm q)}\{[(p-1)!/(S-0)!]^K\prod_{(Z\pm[S]\pm(q=n))}\{x\}^K+\cdots]\}^{K(Z\pm[S]\pm(q=n)/t}$$
$$=\sum_{(Z\pm[S]\pm q)}(^{K[S]}\sqrt{X})^{K(Z\pm[S]\pm(q=n)/t}$$
$$=\sum_{(Z\pm[S]\pm q)}(1-\eta^2)^K\{X_0\}^{K(Z\pm[S]\pm(q=n)/t};$$

In the formula: In Newton's "binomial", invariant univariate (x)(Sn)=invariant group multivariate $(^{K[S]}\sqrt{X})^{K(Z\pm[S]\pm(q=n)/t}$;

[Proof 2.2.1]: Proof of Necessity:

Assume:

$$\{X_0\}^{K(Z\pm[S]\pm(N)+(q=S))}$$
$$=\sum_{(Z\pm S)}(1/C_{([S]\pm N\pm q)})^K[\prod_{(Z\pm[S]-q)}(x_1^K+x_2^K\cdots x_S^{(+1)})]^{K(Z\pm[S]\pm(N)+(q))};$$

Finite polynomial first term:

$\{X_0\}^{K(Z\pm[S]\pm(N)+(q=0))}=(x_1x_2\cdots x_S)=\{X\}^{K(Z\pm[S]\pm(N)+(q=0))}$,(q=0 or S), A=1,

The second term of the finite polynomial: $\{X_0\}^{K(Z\pm[S]\pm(N)\pm(q=1))}=\{X_0\}^{K(\pm1)}$;（q=±1）,B=SD$_0$

Apply regularization coefficient symmetry:$(1/C_{([S]\pm N+q)})=(1/C_{([S]\pm N-q)})$;

(2.2.1)

$$\{\sum_{(Z\pm S)}(1/C_{([S]\pm N+q)})^{(+1)}[\prod_{(Z\pm[S]+q)}\{X\}^{(+1)}+\cdots]\}^{K(Z\pm[S]\pm(N)+(q))}\cdot\{X_0\}^{K(Z\pm[S]\pm(N)+(q=S))}$$
$$=\{\sum_{(Z\pm S)}(1/C_{([S]\pm N-q)})^{(-1)}[\prod_{(Z\pm[S]-q)}(x_1^{(-1)}+\cdots)]\}^{K(Z\pm[S]\pm(N)-(q))};$$

(2.2.2)

$$d\{X\}=d(x_1x_2\cdots x_S)=(x_1x_2\cdots x_S)/\{X_0\}^{K(+1)}\cdot\{X_0\}^{K(+1)}$$
$$=[\{X\}^{K(1)}/(x_1x_2\cdots x_S)]^{(-1)}\cdot\{X_0\}^{K(+1)}$$
$$=[\{X_0\}^{K(1)}/\sum_{(Z\pm S)}(1/C_{([S]\pm N\pm q)})^{K}\prod_{(Z\pm S\pm N\pm(q=q-1))}(x_1x_2\cdots x_S)+\cdots]^{(-1)}$$
$$\{X_0\}^{K(Z\pm[S]\pm(N)+(q=S))}\cdot\{X_0\}^{K(Z\pm[S]\pm(N)-(q=S))}\cdot\{X_0\}^{K(+1)}$$
$$=[\sum_{(Z\pm S)}(1/C_{([S]\pm N\pm q)})^{(-1)}[\prod_{(Z\pm[S]-q)}(x_1^{(-1)}+x_2^{(-1)}\cdots x_S^{(-1)})]^{K(Z\pm[S]\pm(N)-(q))}\cdot\{X_0\}^{K(Z\pm[S]\pm(N)+(q=S))}\cdot\{X_0\}^{K(+1)};$$

Move $\{X_0\}^{K(+1)}$ to the left side of the equal sign to become $\{X_0\}^{K(-1)}$, get reciprocity

(2.2.3)

$$\{X\}^{K(Z\pm[S]\pm(N)\pm(q))}=\{X\}^{K(Z\pm[S]\pm(N)+(q))}\cdot\{X\}^{K(Z\pm[S]\pm(N)-(q))}$$
$$=\{X\}^{(-1)}\cdot\{X\}^{(+1)}$$
$$=(1-\eta^2)^{K(Z\pm[S]\pm(N)\pm(q))}\{X_0\}^{(-1)}\cdot\{X_0\}^{(+1)};\ \cdots;$$

Similarly, the iterative method continues to decrease (increase) the dimensions sequentially: the iterative method sequentially decreases (increases) the dimensions until [(S-1) or (0-S) ± (q-0)],(q=0,1,2,3⋯,P≤S) are all established.

Quoted circle logarithm $(1-\eta^2)^K\{^{K[S]}\sqrt{X/X_0}\}^{K(Z\pm[S]\pm(q=+n)}$;(n=0,1,2,3 ⋯ P≤[S]) group combination into and reciprocity.

(2.2.4)

$$\{X^{K[S]}\}=(x_1x_2\cdots x_S)^K=(x_1x_2\cdots x_S)/\{X_0\}^{K(+P)}\cdot\{X_0\}^{K(+P)}$$
$$=\sum_{(Z\pm[S]\pm q)}\{X_0\}^{K(Z\pm[S]\pm(N)\pm(q=-P))}\cdot\{X_0\}^{K(Z\pm[S]\pm(N)\pm(q=+P))}$$
$$=\sum_{(Z\pm[S]+q)}\{X_0\}^{K(q=+P)}\pm\sum_{(Z\pm[S]-q)}\{X_0\}^{K(q=-P)};$$

[Proof 2.2.2]: Sufficiency proof:

Quoted circle logarithm $(1-\eta^2)^K\{X_0\}/\{^{K[S]}\sqrt{X}\}^{K(Z\pm[S]\pm(q=n)}$;(n=0,1,2,3 ⋯ P≤[S])group combination is converted into multiplicative reciprocity.

(2.2.5)

$$\{X^{K[S]}\}=(x_1x_2\cdots x_S)^K/\{X_0\}^{K(Z\pm[S]\pm(q=n)}\cdot\{X_0\}^{K(Z\pm[S]\pm(q=+n)}$$
$$=\sum_{(Z\pm[S]\pm q)}\sum_{(Z\pm[S]\pm q)}[^{K[S]}\sqrt{(x_1x_2x_S)}]^{K[S]}/(1-\eta^2)^K\{^{K[S]}\sqrt{X}\}^{K(Z\pm[S]\pm(q=-n)}\cdot\{X_0\}^{K(Z\pm[S]\pm(q=+n)}$$
$$=\sum_{(Z\pm[S]\pm q)}\{^{K[S]}\sqrt{X}\}^{K(Z\pm[S]\pm(q=+n)}\cdot(1-\eta^2)^K\{X_0\}^{K(Z\pm[S]\pm(q=-n)}$$
$$=\sum_{(Z\pm[S]\pm q)}\{^{K[S]}\sqrt{X}\}^{K(Z\pm[S]\pm(q=+n)}\cdot\{^{K[S]}\sqrt{X}\}^{K(Z\pm[S]\pm(q=-n)}$$
$$=\sum_{(Z\pm[S]\pm q)}\{^{K[S]}\sqrt{X}\}^{K(q=+n)}\cdot\{^{K[S]}\sqrt{X}\}^{K(q=-n)};$$

[Proof 2.2.3]: Proof of polynomial reciprocity sufficiency and necessity:

Polynomial: Known boundary function $(^{K[S]}\sqrt{X})=(^{K[S]}\sqrt{D})$, $\{X_0\}=\{D_0\}$, polynomial coefficient=(combination coefficient) •(mean function). The discriminant is introduced to become the logarithm of the circle, which handles the relationship between the root and the coefficient well. Combine (1.2.4)-(1.2.5) to form a polynomial.

(2.2.6)

$$\{X_0\pm{}^{K[S]}\sqrt{X}\}^{K(Z\pm[S]\pm(q)}$$
$$=\sum_{(Z\pm[S]\pm(q=p))}\{(1/C_{([S]\pm(q=p))})^K(^{K[S]}\sqrt{X})\cdot D_0\}^{K(Z\pm[S]\pm(q)}$$
$$=(1-\eta^2)^K\cdot\{X_0\pm D_0\}^{K(Z\pm[S]\pm(q)}$$
$$=[(1-\eta^2)^K\cdot(0,2)\cdot\{D_0\}]^{K(Z\pm[S]\pm(q)};$$

2.3, [Proof 2]: isomorphism (homology, homotopy, homomorphism) topological circle logarithm theorem

Isomorphism, Homotopy : The invariant group "mean function" is formed by regularization coefficients, which are converted into probability-topological circle logarithms. Complex polynomials have the same time reduction as simple polynomials, that is, "P=NP problem" for the proof of isomorphic circular logarithms. In particular, the relationship between the calculus order value (±N) and the logarithm of the circle is proved later.

(2.3.1)

$$(1-\eta^2)^K=\{X\}^{K(Z\pm[S]-(N)-(q))}/\{X\}^{K(Z\pm[S]+(N)+(q))}$$
$$=\{X_0\}^{K(Z\pm[S]-(N)-(q)}/\{X_0\}^{K(Z\pm[S]+(N)+(q))}$$
$$=[\sum_{(Z\pm[S]-q)}(x_1^{(-1)}+x_2^{(-1)}\cdots x_S^{(-1)})]^{K(Z\pm[S]-(N)-(q))}/[\sum_{(Z\pm[S]+q)}(x_1^{(+1)}+x_2^{(+1)}\cdots x_S^{(+1)})]^{K(Z\pm[S]+(N)+(q))}$$
$$=(1-\eta^2)^{K(Z\pm[S]-(N)-(q)}\cdot(1-\eta^2)^{K(Z\pm[S]+(N)+(q)}$$
$$=f^{(-1)}\cdot f^{(+1)}=G(\cdot)\cdot F(\cdot)=\{0\text{ to }1\};$$

Homomorphs: A form of comparison that has the same one-to-one mapping between closed groups and groups, groups and monomers, and monomers and monomers.

(2.3.2)

$$(1-\eta^2)=(1-\eta^2)^{K(Z\pm[S]\pm(N)+(q=0))}+(1-\eta^2)^{K(Z\pm[S]\pm(N)+(q=1))}+(1-\eta^2)^{K(Z\pm[S]\pm(N)+(q=2))}+\cdots;$$

Homology : Any function element has an interaction combination, which is converted into a unit body (eigenmode) as an invariant group, and the corresponding probability-topological circle logarithm is used for stability, optimization and control of complex multi-body systems and unite.

(2.3.3)

$$(1-\eta^2)=\{^{KS}\sqrt{X/X_0}\}^{K(Z\pm[S]\pm(N)+(q=0,1,2,3\cdots))}$$
$$=(1-\eta^2)^{K(Z\pm[S]\pm(N)+(q=0))}=(1-\eta^2)^{K(Z\pm[S]\pm(N)+(q=1))}$$
$$=(1-\eta^2)^{K(Z\pm[S]\pm(N)+(q=2))}=\cdots;$$

2.4. [Proof 3]: Classical algebra and logical algebra are optimized into a unified polynomial theorem

In 1824, Abel's quintic equation was unsolvable, and Lagrange-Vandermond-Raffiny-Cauchy and others all proved that general quintic equations were unsolvable. s causes both the calculus equations of classical algebra and the pattern recognition calculation of logic algebra to face difficulties.

Here, we solve the univariate five (higher) order calculus equation, and successfully integrate the above two different fields into a mathematical model.

2.4.1. Logical (forward) analysis of classical algebra

(2.4.1)

$\{X\pm{}^{S}\sqrt{\mathbf{D}}\}^{K(Z\pm S\pm Q\pm M\pm\cdots\pm(N=0,1,2)\pm(q=0,1,2,3\cdots P)/t}$

$=A({}^{S}\sqrt{x})^{K(Z\pm[S]\pm N\pm(q=0)}\pm B({}^{S}\sqrt{x})^{K(Z\pm[S]\pm N\pm(q=1)}+\cdots$

$+Px^{K(Z\pm[S]\pm N\pm(q=p-1)}\pm\cdots+\mathbf{D}$

$=(1-\eta^2)[({}^{S}\sqrt{x})^{K(Z\pm[S]\pm N-(q=0)}\pm[D_0({}^{S}\sqrt{x})]^{K(Z\pm[S]\pm N\pm(q=1)}+\cdots$

$+[D_0({}^{S}\sqrt{x})]^{K(Z\pm[S]\pm N\pm(q=p-1)}\pm[D_0]^{K(Z\pm[S]\pm N+(q=S)}$

$=(1-\eta^2)^K\cdot\{X_0\pm D_0\}^{K(Z\pm S\pm Q\pm M\pm\cdots\pm(N=0,1,2)\pm(q=0,1,2,3\cdots P)/t}$

$=[(1-\eta^2)\cdot\{0,2\}\cdot\{D_0\}]^{K(Z\pm S\pm Q\pm M\pm\cdots\pm(N=0,1,2)\pm(q=0,1,2,3\cdots P)/t}$;

According to$({}^{S}\sqrt{\mathbf{D}})$、$\{D_0\}$ to form a stable polynomial, convert to stable $(1-\eta^2)=\{0\text{ to }1\}^K$ circle logarithm and center zero analysis.

2.4.2. The (reverse) cognition of the arithmeticalization of logical algebra

(2.4.2)

$[\{0,2\}\{D_0\}]^{K(Z\pm S\pm Q\pm M\pm\cdots\pm(N=0,1,2)\pm(q=0,1,2,3\cdots P)/t}$

$=\{X_0\pm D_0\}^{K(Z\pm S\pm Q\pm M\pm\cdots\pm(N=0,1,2)\pm(q=0,1,2,3\cdots P)/t}$

$=A({}^{S}\sqrt{x})^{K(Z\pm[S]\pm N\pm(q=0)}\pm B({}^{S}\sqrt{x})^{K(Z\pm[S]\pm N\pm(q=1)}+\cdots$

$+Px^{K(Z\pm[S]\pm N\pm(q=p-1)}\pm\cdots+\mathbf{D}]$

$=(1-\eta^2)[({}^{S}\sqrt{x})^{K(Z\pm[S]\pm N-(q=0)}\pm[D_0({}^{S}\sqrt{x})]^{K(Z\pm[S]\pm N\pm(q=1)}+\cdots$

$+[D_0({}^{S}\sqrt{x})]^{K(Z\pm[S]\pm N\pm(q=p-1)}\pm[D_0]^{K(Z\pm[S]\pm N+(q=S)}$

$=(1-\eta^2)^K\cdot\{X\pm{}^{S}\sqrt{\mathbf{D}}\}^{K(Z\pm S\pm Q\pm M\pm\cdots\pm(N=0,1,2)\pm(q=0,1,2,3\cdots P)/t}$;

According to$({}^{S}\sqrt{\mathbf{D}})$、$\{D_0\}$ to form a stable polynomial, convert to stable $(1-\eta^2)=\{0\text{ to }1\}^K$ circle logarithm and center zero analysis.

2.4.3, circle logarithmic domain and center zero

According to the reciprocity theorem and the system $({}^{[S]}\sqrt{x})$，D_0 satisfies the discriminant and has a stable invariant group. Through the polynomial theorem, the definition domain of the logarithmic critical line of the stability circle is obtained from {0 to 1}.

(2.4.3)

$[(1-\eta^2)^{(+1)}\cdot(1-\eta^2)^{(-1)}]^{K(Z\pm S\pm Q\pm M\pm\cdots\pm(N=0,1,2)\pm(q=0,1,2,3\cdots P)/t}=\{0,1\}^K$;

(2.4.4)

$[(1-\eta^2)^{(+1)}+(1+\eta^2)^{(+1)}]^{K(Z\pm S\pm Q\pm M\pm\cdots\pm(N=0,1,2)\pm(q=0,1,2,3\cdots P)/t}=\{0,1\}^K$;

(2.4.3)-(2.4.4)The center zero is obtained by solving the circle logarithmic simultaneous equation,

(2.4.5)

$(1-\eta^2)^K=\{({}^{[S]}\sqrt{x})/D_0\}^{K(Z\pm[S]\pm(N=0,1,2)\pm(q=0,1,2,3\cdots n)/t}$

$=\{0:[0\text{ to }(1/2)\text{ to }1]:1\}^K$;

Definition of central zero point: refers to the combination of multi-variables at the same level in the system, under the condition of $(1-\eta^2)^K=\{1/2\}^K$, satisfying the probability circle logarithm $[0\leftarrow(1/2)\rightarrow1]$ symmetry

(2.4.6)

$\{\sum_{(Z\pm S\pm q)}(+\eta)=\sum_{(Z\pm S\pm q)}(-\eta)\}^{K(Z\pm[S]\pm(N=n)\pm(q)/t}$,

(2.4.7)

$(\eta)^K=\sum_{(Z\pm S\pm q)}(\pm\eta)^{K(Z\pm[S]\pm(N=n)\pm(q=0,1,2,3\cdots n)/t}=\{0:[0\leftarrow(1/2)\rightarrow1]:1\}^K$;

(2.4.8)

$(\eta)^K=\sum_{(Z\pm S\pm q)}(\pm\eta)^{K(Z\pm[S]\pm(N=n)\pm(q=0,1,2,3\cdots n)/t}=\{0:[-1\leftarrow(0)$到$\rightarrow1]:1\}^K$;

become the branch point of the tree-like hierarchy, corresponding to the corresponding mean function $[(1-\eta^2)^K\{D_0\}]^{K(Z\pm[S]\pm(N=n)\pm(q)/t}$ satisfies the simplification of complex many-body systems , precise description.

3 、 Circle logarithm and perfect circle mode-mean function

In 1847, the British mathematician Boole proposed a logical mathematical calculation method for dealing with the relationship between two values, including union, intersection, and subtraction. This logic operation method is used in graphics processing operations to generate new shapes from simple combinations of basic graphics. And from two-dimensional Boolean operations to three-dimensional graphics Boolean operations. Logical calculations that use the principle of symmetry in operations. The shortcoming is that for a large number of asymmetric phenomena, how to convert them into symmetrical expansions, there is a lack of interpretable mathematical proofs. This problem has so far not been satisfactorily dealt with.

The idea of a perfect circle model is proposed: the reciprocal combination of classification, identification, induction, multiplication and addition of known univariate element-clustering (including multi-parameter, heterogeneity), graphics processing is to be positive at any point The center point of the circle and a sufficiently large radius range to form a mean function - a perfect circle function. Mathematically rigorous proof: the phenomenon of element-cluster asymmetry-discreteness-correlation, through the uniform optimization of a perfect circle into a symmetrical mean function-a perfect circle model as the core, any high-order calculus dynamic equation, mapped to no The "circular logarithm-neural network" of derivatives, limits, and logical symbols is a classical algebraic calculation method that is controllable, feasible, and zero-error.

The said asymmetric element-cluster set composition is relatively symmetrical, which means that once the circular logarithm is removed, the asymmetry is restored. "Circle logarithm-neural network" mainly consists of probability circle logarithm, topological circle logarithm, perfect circle circle logarithm (including center zero point, multi-parameter, multi-heterogeneous, multi-level), etc., which form a highly parallel and highly serialized network. Tree encoding distribution and normalized logarithm of circles, uniformly controlled between {0 to 1}. It is called circular log gauge invariance.

3.1. Theorem of invariance of three "1" gauges of circular logarithms

Definition 3.1.1. Probability (linear) circular logarithm: each element of the group combination function is divided by the entire group combination function

(3.1.1)

$$(1-\eta_H^2)^{K(Z/t)}=\Sigma_{(i=S)}[\{x_j\}/\{x\}]^{K(Z/t)}$$
$$=[\{x_j\}/\{x_1+x_2+\cdots+x_S\}]^{K(Z/t)}=\{0 \text{ 或 } 1\}^{K(Z/t)};$$

Definition 3.1.2. Topological (non-linear) circle logarithm: the mean of each sub-item of the group combination is divided by the mean of the whole item.

(3.1.2)

$$(1-\eta_T^2)^{K(Z/t)}=\Sigma_{(i=S)}[\{x_{j0}\}/\{x_0\}]$$
$$=\Sigma_{(i=S)}[(1/C_{(S\pm N\pm q)})^K \ \Pi_{(i=q)}\{x_j\}/(1/C_{(S\pm N\pm(q=S))})^K \ \Pi_{(i=q)}\{x_1x_2\cdots x_p\}^K+\cdots]^K=\{0 \text{ to } 1\}^{K(Z/t)};$$

Definition 3.1.3. Logarithm of a perfect circle (center zero point): The group combination of this combination element is divided by the mean value of the corresponding item, and the asymmetric distribution is converted into a uniform distribution, which is called the mean function.

(3.1.3)

$$(1-\eta_\omega^2)^{K(Z/t)}=\Sigma_{(i=S)}[\{x_j\}/\{x_0\}]^{K(Z/t)}$$
$$=\Sigma_{(i=S)}[\Pi_{(i=p)}\{x_{ji}\}/(1/C_{(i=p)})^K \Pi_{(i=q)}(1/C_{(i=p)})\{x_1+x_2+\cdots+x_p\}]^{K(Z/t)}$$
$$=\Sigma_{(i=S)}[\{x_{ji}\}/(1/C_{(i=p)})\{x_1+x_2+\cdots+x_p\}]^{K(Z/t)}$$
$$=(1-\eta_\omega^2)^{+(Z/t)}+(1-\eta_\omega^2)^{-(Z/t)}=\{0 \text{ or } 1\}^{K(Z/t)};$$

(3.1.4) $$(1-\eta_\omega^2)^{K(Z/t)}=\{0 \text{ or } 1\}^{K(Z/t)};$$

Definition 3.1.4. Evaluation of circle logarithm stability of group combination: invariant group characteristic modulus $\{D_0\}^{K(Z/t)}$ and boundary condition **D**, the stable, optimized and controllable circle logarithm of the evaluation system is obtained through the discriminant : The difference between the mean function of a perfect circle and any circle, function, or the distance between the center of the perfect circle and the center of mass. It is best to be close to the center of a perfect circle or a perfect circle curve, with good stability.

(3.1.5)

$$(1-\eta^2)^{k(Z/t)}=[(1-\eta_H^2)\cdot(1-\eta_\omega^2)\cdot(1-\eta_T^2)]^{K(Z/t)}=\{0\to(1/2)\leftarrow1\}^{k(Z/t)};$$

(3.1.6)

$$(1-\eta^2)^{k(Z/t)}=[(1-\eta_H^2)\cdot(1-\eta_\omega^2)\cdot(1-\eta_T^2)]^{K(Z/t)}=\{-1\to(0)\leftarrow+1\}^{k(Z/t)};$$

3.2、Perfect Circle Pattern Theorem

Definition 3.2.1 The multi-parameter theorem of perfect circle mode: It means that each single variable can contain multiple parameters, avoiding mode confusion and mode collapse. In the polynomial theorem, there is group combination invariance, and the pattern recognition clustering is expressed as multi-parameter $\{X\}=\{x_j\omega_iR_k\}$. Among them, the weight parameter $\{\omega_i=\omega_\alpha\omega_\beta\omega_\gamma\cdots\}$, the heterogeneity parameter (network level parameter) $\{R_k=r_\alpha r_\beta r_\gamma\cdots\}$, combined with the multi-univariate root {X0}={xj0ω i0Rk0}, the circular logarithmic control maintains multi-parameter characteristics. The parsing-cognitive process maintains parameter independence.

Definition 3.2.2 Perfect circle weight mode: the circle logarithm of the weight parameter. Select any point (O_1) in the first level, make a perfect circle with a radius of (ω_1), surround all clusters $\{X_{j1}\}=\Sigma_{(i=S)}\{x_j\}$, and form a multi-weight parameter $\sum_{(Z\pm S)}\{x_j\omega_i\}$, represents the centroid point (C_1)formed by the asymmetric distribution, corresponding to $\{X\}=\{x_j\omega_i\}=\sum_{(Z\pm S)}\{x_j\omega_{i\alpha\beta\gamma}\}$, the$(C_1-O_1)$ distance is the radius circle $(\omega_i)=(\omega_{i(\alpha\beta\gamma)})$, move$(C_1)$ to (O_1) and superimpose, and get the$\{x_j\}$invariant group $(1-\eta_{\omega1(\alpha\beta\gamma)}^2)=\{^{\omega}\sqrt{x_j\omega_i/x_{j0}\omega_{10}}\}=\{^{\omega}\sqrt{\omega_i/\omega_{10}}\}$;

[Proof 4]: Perfect circle mode

Suppose: the perfect circle mode variable element $\{X_j\}$ weight mean function $\{\omega_0\}=\{\omega_{0\alpha\beta\gamma}=\omega_{0\alpha}\omega_{0\beta}\omega_{0\gamma}\cdots\}$; heterogeneity mean function $\{\omega_0\}=\{R_0=r_{0\alpha}r_{0\beta}r_{0\gamma}\cdots\}$; multi-parameter, heterogeneity function $\{^{\omega}\sqrt{}^{\omega}\sqrt{X_j}/\{X_{0j}\}\cdot\{^{\omega}\sqrt{\omega_i/\omega_{i0}}\}\cdot\{^{\omega}\sqrt{R_k/R_{k0}}\}$:

(3.2.1)

$$(1-\eta_\omega^2)^{K(Z\pm[S,Q,M]/t)}$$
$$=[(1-\eta_{jiik1}^2)^{K(Z\pm[S])/t}\{X_0^S\}+(1-\eta_{jiik2}^2)^{K(Z\pm[Q])/t}\{X_0^Q\}+\cdots+(1-\eta_{jikP}^2)^{K(Z\pm[M])/t}[\{X^S\}+\{X^Q\}+\cdots+\{X^M\}]/\{X_0^{[S]}\}]^{K(Z\pm[S,Q,M]/t)};$$
$$=[\{^{\omega}\sqrt{}^{\omega}\sqrt{X_j}/\{X_{0j}\}\cdot\{^{\omega}\sqrt{\omega_i/\omega_{i0}}\}\cdot\{^{\omega}\sqrt{R_k/R_{k0}}\}]^{K(Z\pm[S,Q,M]\pm[S]\pm(N)\pm(q)/t)};$$

(3.2.2)

$$(1-\eta_\omega^2)^{K(Z\pm[S,Q,M]/t)}=\{0\leftarrow(1/2)\rightarrow1\};$$ (Center-zero symmetry expansion)

Where:

$$(1-\eta_{xj\omega i}^2)^{K(Z/t)}=(1-\eta_{xj\omega i}^2)^{K(Z\pm[S,Q,M]\pm[S]\pm(N=0,1,2)\pm(q=1)/t)};$$ one-dimensional linear space:

$$(1-\eta_{xj\omega i}^2)^{K(Z/t)}=(1-\eta_{xj\omega i}^2)^{K(Z\pm[S,Q,M]\pm[S]\pm(N=0,1,2))\pm(q=2)/t)};$$ (two-dimensional linear plane, curved surface, rotating space)

$$(1-\eta_{xj\omega i}^2)^{K(Z/t)}=(1-\eta_{xj\omega i}^2)^{K(Z\pm[S,Q,M]\pm[S]\pm(N=0,1,2))\pm(q=3)/t)};$$ (three-dimensional sphere, number axis precession space)

$$(1-\eta_{xj\omega i}^2)^{K(Z/t)}=(1-\eta_{xj\omega i}^2)^{K(Z\pm[S,Q,M]\pm[S]\pm(N=0,1,2))\pm(q=5)/t)};$$ (five-dimensional three-dimensional five-dimensional vortex space)

$$(1-\eta_{xj\omega i}^2)^{K(Z/t)}=(1-\eta_{xj\omega i}^2)^{K(Z\pm[S,Q,M]\pm[S]\pm(N=0,1,2))\pm(q=[S]/t)};$$ (system multi-level neural network);

Definition 3.2.3 The perfect circle mode of the system: it has the characteristics of multi-element, multi-parameter, multi-heterogeneous calculus optimization circle logarithm and center zero point symmetry.

(3.2.3)

$(1-\eta^2)^{K(Z\pm[S,Q,M]/t)}=(1-\eta_\omega{}^2)(1-\eta_H{}^2)(1-\eta_T{}^2)=\{0:(0\leftarrow 1/2\rightarrow 1): 1\}$;

Definition 3.2.4 The logarithm of the system circle is in the three-dimensional solid high-dimensional surface space of the system.Definition 3.2.4 The logarithm of the system circle is in the three-dimensional solid high-dimensional surface space of the system**{i,J,K}**.

(3.2.4)

$(1-\eta^2)=(1-\eta_{[xyz+uv]}{}^2)=(1-\eta_{\mathbf{[yz]}[xyz+uv]}{}^2)\ \mathbf{i}+(1-\eta_{\mathbf{[zx]}[xyz+uv]}{}^2)\ \mathbf{J}+(1-\eta_{\mathbf{[xy]}[xyz+uv]}{}^2)\ \mathbf{K}$;

In particular, the perfect circle pattern is called mean function analysis for calculus equations; it is called perfect circle recognition for pattern recognition cluster sets.

4 、 Calculus Equations-Pattern Recognition Clustering Set Order Value Theorem

Traditional calculus and pattern recognition deal with numbers and shapes, respectively. The novel calculus equation optimizes the two different mathematical fields of classical algebra and logical algebra into an abstract and controllable circular logarithm in {0 to 1} cognition and analysis.

In 1732 Euler pointed out that the expression for the solution of any equation of degree n might look like this:

$$A(\sqrt[n]{x})^{(S-0)}\pm B(\sqrt[n]{x})^{(S-1)}+C(\sqrt[n]{x})^{(S-2)}\pm\cdots+P(\sqrt[n]{x})^{(S-p+1)}\pm\cdots;$$

In 1827, the mathematician Abel proved that "there is no algebraic solution to the general quintic equation". For hundreds of years, many mathematicians have not obtained satisfactory general solution calculations except Galois's discrete special case calculations. Here, discover the rules of calculus polynomial roots and coefficients, prove the relationship between Euler's logarithm and calculus order, and the solution of any Euler's equation of degree n.

4.1、An extension of the traditional calculus order value

The order value is calculated as the calculus order value$(\pm N=1)$,$dx=[\sqrt[KS]{\{x_1x_2\cdots x_S\}}]$and $dx=[(1/S)\{x_1+x_2+\cdots+x_S\}]$” . Increment or decrease one by one is called iterative method. The following is a proof of the order change of the "mean function$\{X_0\}^{KS}$":

The easiest way to choose is from the second term of the zero-order polynomial $B=SD_0$. D_0 is the mean function, the boundary condition $\mathbf{D}=(\sqrt[K[S]]{\mathbf{D}})^{K[S]}$, based on $\mathbf{D_0}$ and $\mathbf{D}=(\sqrt[K[S]]{\mathbf{D}})^{K(Z\pm[S]\pm(N)\pm(q))/t}$is uniqueness determination, then circular logarithm$(1-\eta^2)^K=\{(\sqrt[S]{\mathbf{D}}/\mathbf{D_0}\}^{K(Z\pm[S]\pm(N)\pm(q))/t}$ is also uniquely determined, and each unit variable-cluster $\{x_1x_2\cdots x_S\}$ in the group combination is also uniquely determined. Obviously, it is known that $\mathbf{D}_0$ is an invariant group, which controls the change of$(1-\eta^2)$, that is, controls $(\mathbf{D})$, which is called analysis. Conversely, controlling the change of $(\mathbf{D})$, that is, controlling the establishment of $(1-\eta^2)$, is called recognition and cognition.

Let: $\mathbf{D}$ be the multivariate combination, $\mathbf{D}_0$ is the mean function of the multivariate combination. Introduce polynomial regularization combined coefficient processing to become the mean function:

$\{X\}^{K(Z\pm S)}=\prod_{(Z\pm S\pm(q=0\text{ 或 }S))}\{x_1x_2\cdots x_S\}^K$;

$K=\pm1,\pm0=(-1)\bullet(+1)$; called property function;

$\{X_0\}^{K(Z\pm S+(q=+1)}=[(1/S)^{(+1)}\{x_1{}^{(+1)}+x_2{}^{(+1)}+\cdots+x_S{}^{(+1)}\}]^{K(Z\pm S+(q=+1)}$; called positive linear function;

$\{X_0\}^{K(Z\pm S+(q=-1)}=[(1/S)^{(-1)}\{x_1{}^{(-1)}+x_2{}^{(-1)}+\cdots+x_S{}^{(-1)}\}]^{K(Z\pm S+(q=-1)}$; called inverse linear function;

$\{X_0\}^{K(Z\pm S\pm(q=\pm1)}=[(1/S)^{(\pm1,\pm0)}\{x_1{}^{(\pm1)}+x_2{}^{(\pm1)}+\cdots+x_S{}^{(\pm1)}\}]^{K(Z\pm S\pm(q=\pm1)}$; called neutral or zero transfer function;

[Proof 5] Calculus order value change

Newton's binomial is sequentially expanded by an iterative method, which is credible under the condition of zero-point order, but it is not suitable for introducing the change of calculus order value. The univariate order value extended multivariate mean function has a similar form with different connotations. The derivative $(-N=1)=dx$ is lowered by one order; the integral$(+N=1=\int xdx)$ is raised by one order. Comparison of order value changes of univariate and multivariate mean functions

4.1.1、 Differential equation (-N=0,1,2,3⋯); p represents the polynomial term order, and (p-1) is the form of {q} differential combination.

(1) Univariate: Univariate satisfies the integer change of unit order value with the "function (x) invariance feature".

(4.1.1)

$U\rightarrow du/dx;\quad x^2\rightarrow 2x;\ x^3\rightarrow 3x^2;\cdots;\ x^n\rightarrow nx^{(n-1)}$;

$U\rightarrow \int udx;\quad x^2\rightarrow (1/3)x^3;\quad x^3\rightarrow (1/4)x^4;\ \cdots;\quad x^n\rightarrow (1/(n+1)x^{(P+1)}$;

Formula (4.1.1) The change of calculus order value can only be adapted to univariate, not multivariate "direct univariate individual".

(2) Multivariate: Multivariate satisfies the integer change of unit order value with the "mean value function $\{X_0\}$ invariance characteristic".

(4.1.2)

$U\rightarrow du/dx_0;\quad x_0{}^2\rightarrow 2x_0;\ x_0{}^3\rightarrow 3x_0{}^2;\ \cdots;\ x_0{}^n\rightarrow$

$(n+1)x_0^{(n+1)}$;

(4.1.3)

$d^n\{X^S\}=\{X^S\}/dx^n=\{X\}^{K(S\pm(N-n))}$
$= d^n(1-\eta^2)^K\{X_0\}^{(S\pm(N=0)\pm(q)}$
$=(S-(N-n)+(q-n))(1-\eta^2)^K\{X_0\}^{(S\pm(N=-n)\pm(q-n)}$;

(Integral q=S start reduction step)

4.1.2、 Integral equation (+N=0,1,2,3···); p represents the polynomial term order, and (p+1) is the form of {q} integral combination.

(4.1.4)

$U\to\int udx_0$; $x_0^2\to(1/3)x_0^3$; $x_0^3\to(1/4)x_0^4$; ···; $x_0^n\to(1/(n+1)\{X_0\}^{(n+1)}$;

(4.1.5)

$\int^n\{X_0\}^{(S\pm(N=0+n)\pm(q)}dx^n=(1-\eta^2)^K\{X_0\}^{(S\pm(N=0+n)\pm(q)}$; (Integral q=0 starts to increase order)

4.2、Multiplication and Addition Reciprocity Theorem of Calculus Equations

The above circular logarithm proves: from the coefficients of the quadratic equation (a, b, c), the Veda theorem discriminant "$b^2-4ac\geq0$", written as $(1-\eta^2)=(\sqrt{c}/b)^2$=(0 to 1), introduce high-dimensional sub-variables, prove "isomorphism", and expand the logarithm of circles.

4.2.1、 [Proof 4.1]: For (N=1) nonlinear combination (q=1-1 combination) mean function (that is, polynomial combination q=(p-1) term,

According to the principle of polynomial regularization coefficient symmetry, the second sub-term $B=(1/S)^{(+1)}\{X_0\}^{(+1)}=(1/S)^{(-1)}\{X_0\}^{(-1)}$,

(4.2.1)

$\sum_{(S\pm q)}(1/S)^{(-1)}\{[\prod_{(Z\pm S\pm(q=-1))}\{x_1x_2 \cdots x_S\}^K+\cdots]^{(-1)}\cdot\{X\}^{K(Z-S)}\}$
$=\sum_{(S\pm q)}(1/S)^{(-1)}\{x_1^{(-1)}+x_2^{(-1)}+\cdots x_S^{(-1)}\}^{(-1)}=\{X_0\}^{K(Z\pm S+(q=-1)}$;

(4.2.2)

$\{X\}^{K(Z\pm S\pm q)}=\{X\}^{K(Z\pm S\pm(q=-1)}\cdot\{X\}^{K(Z\pm S\pm(q=+1)}$
$=(1-\eta^2)^K\cdot\{X_0\}^{K(Z\pm S\pm(q=1)}$;

4.2.2、 The reciprocity theorem and nonlinear circular logarithms:

[Proof 4.2]: For(N≥2) nonlinear combination (q=2-2 to P-P combination) mean function (i.e. polynomial q⩾(p-2) term, we have

(4.2.3)

$\sum_{(S\pm q)}(1/C_{(S\pm(N=\geq2)\pm(q=-2))})^{(-1)}[\prod_{(Z\pm S\pm(q=-p))}\{x_1x_2 \cdots x_S\}^{(-1)}+\cdots]^{(N=\geq2)}\cdot\{X\}^{(S\pm(N=\geq2)\pm(q=-2))}$
$=\sum_{(S\pm q)}(1/C_{(S\pm(N=\geq2)\pm(q=-))})^{(+1)}[\prod_{(Z\pm S\pm(q=-p))}\{x_1x_2 \cdots x_S\}^{(-1)}+\cdots]^{(N=\geq2)}\cdot\{X\}^{(S\pm(N=\geq2)\pm(q=-2))}$
$=\{X\}^{K(S\pm(N=\geq2)\pm(q=-2))}$;

(4.2.4)

$\{X\}^{K(S\pm(N=\geq2)\pm(q=2))}$
$=\{X\}^{K(S\pm(N=\geq2)\pm(q=+2))}\cdot\{X\}^{K(S\pm(N=\geq2)\pm(q=-2))}$
$=(1-\eta^2)^K\cdot\{X_0\}^{K(S\pm(N=\geq2)\pm(q=2))}$;

4.3、The circular logarithm$(1-\eta^2)^K$ is equivalent to Euler's natural logarithm(e^x)

Traditional calculus is established on the assumption that a single variable is an invariant group, and the sub-terms of the calculus are composed of a pair of asymmetric reciprocal "group mean functions", in which the reciprocity theorem includes the relationship of "root and coefficient reciprocity". When: the order value changes, one element group is differential (decreased by **n** order), and the other is integral (increased by **n** order). Newton's binomial calculus order value change, in the polynomial, becomes "differential (du/dx) • integral(∫udx)":

4.3.1. Univariate and Euler's natural logarithm e^x

(4.3.1)

$[\sum_{(S\pm N\pm q)}(du/dx)\cdot(\int udx)]\to[nx^{(n-1)}\cdot(1/(n+1)x^{(P+1)}]$
$=[n/(n+1)]x^{(n-1)}\cdot x^{(n+1)}$
$=e^x\cdot x^{(n\pm1)}$;

Here, $e^x=[n/(n+1)]^n$ is obtained by [**n**/(**n**+1)] "limit", and the invariance is univariate $(x)^{K(S\pm(N=n)\pm(q=-n))}$

4.3.2. Multivariate mean function and circular logarithm$(1-\eta^2)^K$

(4.3.2)

$[\sum_{(S\pm N\pm q)}(du/dx)\cdot(\int udx)]\to[nx_0^{(n-1)}\cdot(1/(n+1)x_0^{(P+1)}]$
$=[n/(n+1)][x_0^{(n-1)}\cdot x_0^{(n+1)}]$
$=(1-\eta^2)^K\cdot\{X_0\}^{(n\pm1)}$;

Here, $(1-\eta^2)^K=\prod_{(S\pm N\pm q)}[n/(n+1)]^n=\sum_{(S\pm N\pm q)}[(P-1)!/(S-0)!]$, obtained by the "multiplication and addition reciprocity" rule, the invariant group is the multivariate mean function $\{X_0\}^{K(S\pm(N=\mathbf{n})\pm(q=-\mathbf{n}))}$.

In particular, natural logarithms and isomorphic circular logarithms make certain quantities whose rates of change are proportional to themselves, become derivatives and integrals become functions equal to themselves. Satisfy $e^x=(1-\eta^2)^K$. where e^x=2.718281828···. Since it is a fixed value, the application is limited. $(1-\eta^2)^K$ solves complex multi-body system optimization for controllable, reliable, feasible, and unified neural network circular logarithm is widely used.

(4.3.3)

$[\sum_{(S\pm N\pm q)}(du/dx)\cdot(\int udx)]\to(1-\eta^2)^K\{X_0\}$
$=\sum_{(S\pm N\pm q)}[(1-\eta^2)\{X_0\}]^{(-1)}\cdot[(1-\eta^2)\{X_0\}]^{(+1)}$
$=[(0\text{ to }1)\{X_0\}]^{K(S\pm N\pm q)}$;

4.3.3、Unification for calculus of polynomials (n order synchronized with combinatorial form (q=**n**):

(4.3.4)

$\mathbf{d^n}\{\sum_{(S\pm N\pm q)}[\{X_0\cdot\mathbf{D}_0\}]$ or $\int^{\mathbf{n}}\{\sum_{(S\pm N\pm q)}\{X_0\cdot\mathbf{D}_0\}dx]^{\mathbf{K(Z\pm[S\pm(N=-n)]-(q=-n)/t}}$
$=\sum_{(S\pm N\pm q)}\{X_0\cdot\mathbf{D}_0\}^{\mathbf{K(Z\pm S\pm(N+n)\pm(q=n))/t}}$
$=\{X_0\pm\mathbf{D}_0\}^{\mathbf{K(Z\pm S\pm(N=0,1,2\cdots n)\pm(q=n))/t}}$
$=(1-\eta^2)^K\{0\leftrightarrow2\}\{\mathbf{D}_0\}^{\mathbf{K(Z\pm S\pm(N=0,1,2\cdots n)\pm(q=n))/t}}$;
$(n=\pm0,1,2,3\leq S)$;

(4.3.5)

$(1-\eta^2)^K=\{0: (-1\leftrightarrow 0\leftrightarrow +1): 1\}^{K(Z\pm S\pm(N0,1,2\cdots n)\pm(q=n))/t}$;

Formulas (4.3.1)-(4.3.5) calculus order value memory method:

(1) The change of the differential (unknown) order value is equivalent to moving the sub-items on the right side of the polynomial to the right in a decreasing jumping manner. The known boundary conditions are the opposite.

(2) The change of the order value of the integral (unknown quantity) is equivalent to the integral movement of each sub-item on the right side of the polynomial to the left in a decreasing jump way, and the known boundary conditions are opposite.

5、Calculus Equations - Pattern Recognition

The idea of calculus equation-pattern recognition optimization: the "perfect circle-mean function" invariant group is the expansion of the bottom-order value. in:

(1). Pattern recognition is to classify, identify, induct and combine known univariate elements-clusters (including multi-parameters and heterogeneity) to form higher-order calculus of "mean function and multiplication and addition reciprocity" equation. :

(2). The calculus equation analyzes each univariate element-cluster in order according to the "mean function and the reciprocity of multiplication and addition". The above two different fields form a forward and reverse unified computing system.

Known conditions: power dimension element and number S; average value $\mathbf{D}_0$ or polynomial coefficient （A.B.C⋯P）; boundary condition $\mathbf{D}=\{\sqrt[S]{D}\}^{K(Z)/t}$; power function condition $K(Z)/t=K(Z\pm[S]\pm(N=0,1,2)\pm(q)/t$

Discriminant-circular logarithm: $(1-\eta^2)^K=((\sqrt[S]{\mathbf{D}})/D_0)^K\leq 1$; based on isomorphic circular logarithm, the calculus order value form is invariant.

$\{X\}^{K(Z)/t}=\{x_1x_2\cdots x_S\}=[(1-\eta^2)\{X_0\}]^{K(Z)/t}=(1-\eta^2)^K$;

$d^n(1-\eta^2)^{K(Z\pm[S]\pm(N=0)\pm(q=+n)/t}=(1-\eta^2)^K=\{0$: (0 到(1/2)到 1: $1\}^K$;

$\int^n(1-\eta^2)^{K(Z\pm[S]\pm(N=0)\pm(q=-n)/t}dx^n=(1-\eta^2)^K=\{0$: (0 到(1/2)到 1: $1\}^K$;

when: the zero-order algebraic equation of calculus(±N=0) is a Newton binomial expansion, it is proved by the reciprocity theorem that each sub-function of calculus has the reciprocal relationship between "root and coefficient". where the element combination is synchronized with the one-dimensional time variation. Represents the high-dimensional space construction of calculus zero-order (primitive function, polynomial, higher-order equation) equations.

When:(±N=**n**), it represents the motion state of high (S) order space abstract structure, energy, behavior, etc. of n-order calculus equation.

5.1. First-order calculus (±N=0,1)

First-order calculus **(±N=0,1)**: Indicates the speed, kinetic energy and other high (S) dimensional neural network structure, movement, behavior state.

(5.1.1)

$[d\{x\pm^{K[S]}\sqrt{\mathbf{D}}\}^{K(Z\pm[S]\pm(N=0)\pm(q=0)/t}$ or $\int\{x\pm^{K[S]}\sqrt{\mathbf{D}}\}^{K(Z\pm[S]\pm(N=-1)\pm(q=-1)/t}dx]$

$=(1-\eta^2)^K\cdot\underline{[Ax^{K(Z\pm S\pm(N=1)\pm(S-0))/t}\pm Bx^{K(Z\pm S\pm(N=1)\pm(q=1))/t}+Cx^{K(Z\pm[S]\pm(N=1)\pm(q=2))/t}\pm Px^{K(Z\pm[S]\pm(N=1)\pm(q=P-1))/t}+\cdots}$

$\underline{+Lx^{K(Z\pm[S]\pm(N=1)\pm(q=L-1))/t}\pm\mathbf{D}]}$

$=(1-\eta^2)^K\cdot[(1/(S-0)]^K(x\cdot D_0)^{K(Z\pm[S]\pm(N=1)\pm(q=-1))/t}\pm\cdots$

$+[(P-1)!/(S-0)!]^K(x\cdot D_0)^{K(Z\pm[S]\pm(N=1)\pm(q=-(P-1))/t}$

$\pm[(L-1)!/(S-0)!]^K(x\cdot D_0)^{K(Z\pm[S]\pm(N=1)\pm(q=-(L-1))/t}]$

$=\sum_{(Z\pm(S,Q,M))}(1-\eta^2)^K\cdot\{X_0\cdot\mathbf{D}_0\}^{K(Z\pm[S]\pm(N=1)\pm(q=1))/t}$

$=(1-\eta^2)^K\cdot\{X_0\pm\mathbf{D_0}\}^{(Z\pm[S]\pm(N=1)\pm(q=1))/t}$

$=[(1-\eta^2)\cdot(0\leftrightarrow 2)\cdot\{\mathbf{D}_0\}]^{K(Z\pm[S]\pm(N=1)\pm(q=1))/t}$;

(5.1.2)

$(1-\eta^2)^K=\{0$: (0 to (1/2) to 1): $1\}^{K(Z\pm[S]\pm(N=1)\pm(q=1))/t}$;

5.2、 Second order calculus (±N=0,1,2)

Second-order calculus (±N=0,1,2): Indicates acceleration, energy, etc. (S) dimensional neural network structure, motion, and behavior state.

(5.2.1)

$[d^2\{x\pm^{K[S]}\sqrt{\mathbf{D}}\}^{K(Z\pm[S]\pm(N=1)\pm(q=0)/t}$ or $\int^2\{x\pm^{K[S]}\sqrt{\mathbf{D}}\}^{K(Z\pm[S]\pm(N=1)\pm(q=-2)/t}dx^2]$

$=(1-\eta^2)^K\cdot\underline{[Ax^{K(Z\pm[S]\pm(N=2)\pm(q=0))/t}+Bx^{K(Z\pm[S]\pm(N=2)\pm(q=1))/t}}+Cx^{K(Z\pm[S]\pm(N=2)\pm(q=2))/t}$

$+Px^{K(Z\pm[S]\pm(N=2)\pm(q=P-2))/t}+\cdots$

$+Rx^{K(Z\pm[S]\pm(N=2)\pm(q=R-2)/t}+\underline{Lx^{K(Z\pm[S]\pm(N=2)\pm(q=L-2))/t}+\mathbf{D}}$

$=(1-\eta^2)^K\cdot[(2/(S-0)(S-1)]^K(x\cdot D_0)^{K(Z\pm[S]\pm(N=2)\pm(q=-2))/t}\pm\cdots$

$+[(P-1)!/(S-0)!]^K(x\cdot D_0)^{K(Z\pm[S]\pm(N=2)\pm(q=-(P-2))/t}$

$\pm[(R-1)!/(S-0)!]^K(x\cdot D_0)^{K(Z\pm[S]\pm(N=2)\pm(q=-(R-2))/t}]$

$=\sum_{(Z\pm(S,Q,M))}(1-\eta^2)^K\cdot\{X_0\cdot\mathbf{D}_0\}^{K(Z\pm[S]\pm(N=2)\pm(q=-2))/t}$

$=(1-\eta^2)^K\cdot\{X_0\pm\mathbf{D_0}\}^{(Z\pm S\pm(N=2)\pm(q=-2))/t}$

$=[(1-\eta^2)\cdot(0\leftrightarrow 2)\cdot\{\mathbf{D}_0\}]^{K(Z\pm S\pm(N=2)\pm(q=-2))/t}$;

(5.2.2)

$(1-\eta^2)=[\{\sqrt[5]{\mathbf{D}}\}/\{\mathbf{D_0}\}]^{K(Z\pm S\pm(N=2)\pm(q=-2))/t}=\{0$: (0 to (1/2) to 1): 1};

In the formula: a horizontal line is placed under the item with negative value in the combined form (q=(0,1,2,3...)-2), the integral corresponds to (q=-1,-2); the differential corresponds to (q=+1,+2). Indicates that this item does not exist during differentiation, and returns to zero-order calculus (original function) during integration.

6、Arbitrary Higher Order Calculus Equations and Analysis of Complex Multibody Systems

System: Known conditions and boundary conditions are multi-region, multi-parameter, multi-heterogeneity, and multi-level interaction characteristics.

System Elements - Clustering: $\{X\}=\{x_j\omega_i r_K\}=\{\{X^S\}\in(x_1x_2x_3\cdots x_Tx_Lx_R\cdots x_4x_5\cdots x_S)$; $\{X^Q\}\in(x_1x_2x_3\cdots x_Tx_Lx_R\cdots x_4x_5\cdots x_Q)$; $\{X^M\}\in(x_1x_2x_3\cdots x_Tx_Lx_R\cdots x_4x_5\cdots$

x_M); each system is formed by non-repetitive combination sets according to the system, region and level, satisfying the stable calculus-pattern recognition clustering set balance equation of the discriminant.

Power function $K(Z)/t=K(Z\pm[S]\pm(N=0,1,2\cdots n\leq[S])\pm(q=-0,1,2\cdots n)/t$,

High Parallel $[S]=[Z\pm(S,Q,M\cdots)]$;

High Serial $[S]=[Z\pm(S\pm Q\pm M\cdots)]$;

Calculus high ($n\leq[S]$) order ($\pm N=0,1,2\cdots n)/t$: respectively represent speed; acceleration, energy, force; super acceleration, super energy, supernatural force, etc., the composition system is infinitely high [S]-dimensional neural network spatial motion states.

6.1. Calculus equations and analysis (complete description includes zero-order, first-order, second-order...n-order calculus)

6.1.1. Any high (n) order differential equation:

(6.1.1)

$$\partial^n\{X\pm{}^{K[S]}\sqrt{\mathbf{D}}\}^{K(Z\pm[S]\pm(N=\mathbf{0})\pm(q=0))/t}=(1-\eta^2)^K\cdot\partial^n\{X\pm\mathbf{D_0}\}^{K(Z\pm[S]\pm(N=\mathbf{0})\pm(q=0))/t}$$
$$=(1-\eta^2)^K\cdot[\{(P-1)!/(S-0)!(x\cdot\mathbf{D}_0)^{K(Z\pm S\pm(N=-n)\pm(q=P-\mathbf{n}))/t}\pm\{(Q-1)!/(Q-0)!(x\cdot\mathbf{D}_0)^{K(Z\pm Q\pm(N=-n)\pm(q=Q-n))/t}+\cdots+\{(M-1)!/(M-0)!(x\cdot\mathbf{D}_0)^{K(Z\pm M\pm(N=-n)\pm(q=M-n))/t}]$$
$$=\sum_{(Z\pm(S,Q,M))}(1-\eta^2)^K\cdot\{x\cdot\mathbf{D_0}\}^{K(Z\pm[S]\pm(N=-n)\pm(q=-n))/t}$$
$$=(1-\eta^2)^K\cdot\{X_0\pm\mathbf{D_0}\}^{K(Z\pm[S]\pm(N=-n)\pm(q=-n))/t}$$
$$=[(1-\eta^2)^K\cdot(0\leftrightarrow2)\cdot\{\mathbf{D_0}\}]^{K(Z\pm[S]\pm(N=-n)\pm(q=-n))/t};$$

(6.1.2)

$$(1-\eta^2)=[\{{}^5\sqrt{\mathbf{D}}\}/\{\mathbf{D_0}\}]^{K(Z\pm S\pm(N=2)\pm(q=-n))/t}=\{0:(0\text{ to }(1/2)\text{ to }1):1\};$$

6.1.2、Arbitrarily high (n) order integral equation:

(6.1.3)

$$\int^n\{x\pm{}^{K[S]}\sqrt{\mathbf{D}}\}^{(Z\pm S\pm(N=-n)\pm(q))/t}dx^n=(1-\eta^2)^K\cdot\int^n\{x\pm\mathbf{D_0}\}^{(Z\pm S\pm(N=-n)\pm(q))/t}d^nx$$
$$=\{(P-1)!/(S-0)!(x\cdot\mathbf{D}_0\}^{K(Z\pm[S]\pm(N=+\mathbf{n})\pm(q=P+n+1))/t}\pm\{(P-1)!/(Q-0)!(x\cdot\mathbf{D}_0\}^{K(Z\pm[Q]\pm(N=+\mathbf{n})\pm(q=P+n+1))/t}+\cdots+\{(P-1)!/(M-0)!(x\cdot\mathbf{D}_0\}^{K(Z\pm[M]\pm(N=+\mathbf{n})(N=+\mathbf{n})\pm(q=P+n+1))/t}$$
$$=\sum_{(Z\pm(S,Q,M)}(1-\eta^2)^K\cdot\{X_0\cdot\mathbf{D}_0\}^{K(Z\pm[S]\pm(N=+\mathbf{n})(N=+\mathbf{n})\pm(q=+n))/t}$$
$$=(1-\eta^2)\{X_0\pm\mathbf{D_0}\}^{K(Z\pm[S]\pm(N=+n)\pm(q=+n))/t}$$
$$=[(1-\eta^2)\cdot(0\leftrightarrow2)\cdot\{\mathbf{D_0}\}]^{K(Z\pm[S]\pm(N=+\mathbf{n})\pm(q=+n))/t};$$

(6.1.4)

$$(1-\eta^2)=[\{{}^5\sqrt{\mathbf{D}}\}/\{\mathbf{D_0}\}]^{K(Z\pm S\pm(N=+\mathbf{n})\pm(q=+n))/t}=\{0:(0\text{ to }(1/2)\text{ to }1):1\};$$

6.2、Circular logarithmic calculus equation

(shorthand $K(Z\pm[S]\pm(N)/t=K(Z\pm[S]\pm(N=n)\pm(q=n))/t$ (same below)

The circular logarithmic calculus equation is expanded:

(6.2.1)

$$(1-\eta^2)^K=\sum_{(Z\pm(S,Q,M))}[\{{}^S\sqrt{\mathbf{D}}\}/\{\mathbf{D_0}\}]^{K(Z\pm[S]\pm(N)/t}=\{0:(0\text{ to }(1/2)\text{ to }1):1\}^K;$$

Circular logarithmic calculus isomorphism

(6.2.2) $$(1-\eta^2)^K=(1-\eta^2)^{K(Z\pm[S]\pm(N)/t}=\{0:(0\text{ to }(1/2)\text{ to }1):1\}^K;$$

Circular logarithmic calculus center zero symmetry expansion

(6.2.3)

$$(1-\eta^2)^K=(1-\eta^2)^{K(Z\pm[S]\pm(N)/t}=\{(0\leftrightarrow(1/2)\leftrightarrow1)\}^K\text{or}\{(-1\leftrightarrow(0)\leftrightarrow+1)\}^K;$$

Indicates that any high-dimensional and high-parallel space in the system is synchronously expanded toward the common boundary with {1/2} or {0} as the center symmetry point.

6.3. Three results of arbitrary calculus equations:

(6.3.1)

$$(x_0-\sqrt{\mathbf{D}_0})^{K(Z\pm[S]\pm(N)/t}=[(1-\eta^2)\cdot\{0\}\cdot\mathbf{D_0}]^{K(Z\pm[S]\pm(N)/t};$$

two-dimensional rotation, transformation, ring, complex space subtraction;

(6.3.2)

$$(x_0+\sqrt{\mathbf{D}_0})^{K(Z\pm[S]\pm(N)/t}=[(1-\eta^2)\cdot\{2\}\cdot\mathbf{D_0}]^{K(Z\pm[S]\pm(N)/t};$$

three-dimensional precession, surface, sphere, complex space addition;

(6.3.3)

$$(x_0\pm\sqrt{\mathbf{D}_0})^{K(Z\pm[S]\pm(N)/t}=[(1-\eta^2)\cdot[\{0\leftrightarrow2\}\cdot\mathbf{D}_0]^{K(Z\pm[S]\pm(N)/t};$$

five-dimensional vortex Basic neural network and motion state;

(6.3.4)

$$(1-\eta^2)^K=[\{{}^S\sqrt{\mathbf{D}}\}/\{\mathbf{D_0}\}]^{K(Z\pm[S]\pm(N)/t}=\{0:(0\text{ to }(1/2)\text{ to }1):1\}^K;$$

A vortex space composed of a three-dimensional three-dimensional high-dimensional arbitrary (public rotation + self-rotation).

6.4、Three-dimensional spatial relationship:

Arbitrary space (including multiple parameters){q}; $\{q_{(xyz+uv)}\}$ belongs to the five-dimensional basic space; $\{q_{(jik)}\}$ belongs to the three-dimensional triple generator basic space （jik） satisfies the basic equation of calculus of (±N=0.1.2).

(6.4.1)

$$\{q\}^{K(Z\pm[S]\pm(N)/t}\in\{q_{(xyz+uv)}\}^{K(Z\pm[S]\pm(N)/t}\in\{q_{(jik)}\}^{K(Z\pm[S]\pm(N)/t};$$

In the calculus process, the dimension (S) invariant group corresponds to the expansion of the mean function {D0}

(6.4.2)

$$\{D_0\}^{K(Z\pm[S]\pm(N)/t}=\{D_0\}^{K(Z\pm[S]\pm(N)\pm(q=0)/t}+\{D_0\}^{K(Z\pm[S]\pm(N)\pm(q=1)/t}+\cdots+\{D_0\}^{K(Z\pm[S]\pm(N)\pm(q=[S])/t};$$

The boundary condition {S√D} corresponding to the mean function changes accordingly with the order value and the combination coefficient

(6.4.3)

$$\{{}^S\sqrt{D}\}^{K(Z\pm[S]\pm(N)\pm(q=0)/t},\{{}^S\sqrt{D}\}^{K(Z\pm[S]\pm(N)\pm(q=1)/t},\cdots,\{{}^S\sqrt{D}\}\{D_0\}^{K(Z\pm[S]\pm(N)\pm(q=[S])/t};$$

(1). For multi-parameter and heterogeneity: that is, the multi-parameter and heterogeneity of the system are hidden in the single variable and the corresponding logarithm, which does not affect the calculation of the accuracy of the logarithm. The interference of multi-element, multi-parameter and heterogeneity in the calculation process is avoided, and the phenomenon of mode confusion and mode collapse is prevented. Ensure computational stability, reliable optimization, supervised learning, robustness, and interpretability.

(6.4.4)

$\{X\}^{K(Z\pm[S]\pm(N=n)/t}$
$=\{x_j \cdot (\omega_{i=\alpha\beta\gamma\cdots}) \cdot (R_{K=\alpha\beta\gamma\cdots})\}^{K(Z\pm[S]\pm(N=n)/t}$
$\leftrightarrow(1-\eta^2)\{x_{0j} \cdot (\omega_{0i=\alpha\beta\gamma\cdots}) \cdot (R_{0K=\alpha\beta\gamma\cdots})\}^{K(Z\pm[S]\pm(N=n)/t}$;

(2), high parallel group combination - circle logarithm and concentric circles:

The asymmetry function of any reciprocity is transformed into a symmetrical expansion centered on the logarithm of the central zero point circle. The superposition of the center zero points is called concentric circles.

(a), "Concentric circles" $(1-\eta^2)=\{1/2\}^{K(Z\pm[S]\pm(N=n)/t}$, the control is synchronously expanded in the range of {0 to 1}.

(6.4.5)

$(1-\eta^2)=\{0:(0\leftrightarrow(1/2)\leftrightarrow1):1\}^{K(Z\pm[S]\pm(N=n)/t}$
$=\{0:(\eta_{(0)}\leftrightarrow\eta_{(1/2)}\leftrightarrow\eta_{(1)}):1\}^{K(Z\pm[S]\pm(N=n)/t}$
$=\{0:(x_1x_2x_3\cdots x_T)\leftrightarrow(x_0=(1/2))\leftrightarrow(x_V\cdots x_4x_5\cdots x_S):1\}^{K(Z\pm[S]\pm(N=n)/t}\pm\{0:(x_1x_2x_3\cdots x_Tx_U)\leftrightarrow(x_0=(1/2)\leftrightarrow(x_Ux_V\cdots x_4x_5\cdots x_Q):1\}^{K(Z\pm Q\pm(N=n)/t}\pm\{0:(x_1x_2x_3\cdots x_Tx_Ux_V)\leftrightarrow(x_0=(1/2)\leftrightarrow(x_Tx_Ux_V\cdots x_4x_5\cdots x_M)\}:1\}^{K(Z\pm M\pm(N=n)/t}$;

(b), "Concentric circles"$(1-\eta^2)=\{0\}^{K(Z\pm[S]\pm(N=n)/t}$, the control is synchronously expanded in the range of {-1 to (0) to +1}.

(6.4.6)

$(1-\eta^2)=\{0:(-1\leftrightarrow(0)\leftrightarrow+1):1\}^{K(Z\pm[S]\pm(N=n)/t}$
$=\{0:(\eta_{(0)}\leftrightarrow\eta_{(0)}\leftrightarrow\eta_{(1)}):1\}^{K(Z\pm[S]\pm(N=n)/t}$
$=\{0:(x_1x_2x_3\cdots x_T)\leftrightarrow(x_0=(0)\leftrightarrow(x_V\cdots x_4x_5\cdots x_S):1\}^{K(Z\pm[S]\pm(N=n)/t}\pm\{0:(x_1x_2x_3\cdots x_Tx_U)\leftrightarrow(x_0=(0)\leftrightarrow(x_Ux_V\cdots x_4x_5\cdots x_Q):1\}^{K(Z\pm Q\pm(N=n)/t}\pm\{0:(x_1x_2x_3\cdots x_Tx_Ux_V)\leftrightarrow(x_0=(0)\leftrightarrow(x_Tx_Ux_V\cdots x_4x_5\cdots x_M)\}:1\}^{K(Z\pm M\pm(N=n)/t}$;

The asymmetry function of any reciprocity is transformed into a symmetrical expansion centered on the logarithm of the central zero point circle. The superposition of the center zero points is called concentric circles.

(3) High parallel group combination - logarithm of circle and homeomorphic circle (including sphere and torus structure):

"Homeomorphic circle" $(1-\eta^2)=\{0:(-1\leftrightarrow(0)\leftrightarrow+1):1\}^{K(Z\pm[S]\pm(N=n)/t}$, high serial group combination - The circular logarithm control is synchronously expanded in the range of {-1 to (0) to +1}.That is, the so-called "unary **n**th degree" calculus equation.

To sum up, the complex many-body system is composed of a mixture of "homeomorphic circles" and "concentric circles". Their logarithmic forms are the same, but the corresponding characteristic modules are different. It becomes $(1-\eta^2)\{D_0\}^{K(Z\pm M\pm(N=n)\pm(q)/t}$; in the end, the "root" of the element-set class is phylogenetically encoded tree code sequence, and multiple Area, multi-level, multi-parameter, heterogeneity, form combination or decomposition of composition.

7、Analysis and Cognition of Calculus Equations

The complex multi-body system consists in the form of multi-level tree coding in a mixed way of high parallel and high serial. Finally, it is expanded according to the sequence in the form of element-cluster set combination $\{q\}^{K(Z\pm[S]\pm(N=n)\pm(q=S,Q,M)/t}$; the logarithm of the center zero point circle $(1-\eta^2)$The corresponding eigenmode level $\{D_0\}^{K(Z\pm[S]\pm(N=n)\pm(q=S,Q,M)/t}$ is expanded as a symmetrical balanced tree code decomposition point.

7.1. Find the logarithm of the internal center zero point circle of the function

The logarithm of the center zero point circle corresponds to $(1-\eta^2)^K\{D_0\}^{K(Z\pm[S]\pm(N=n)\pm(q=S,Q,M)\pm n)/t}$.

(7.1.1)

$(1-\eta^2)^K=(1-\eta_\omega^2)\cdot(1-\eta_T^2)\cdot(1-\eta_H^2)=\sum_{(z\pm s\pm q)}\{x_i\}/\{D_0\}=\{0:(0\leftrightarrow(1/2)\leftrightarrow1):1\}^K$;

(7.1.2)

$(1-\eta^2)^K=(1-\eta_\omega^2)\cdot(1-\eta_T^2)\cdot(1-\eta_H^2)=\sum_{(z\pm s\pm q)}\{x_i\}/\{D_0\}=\{0:(-1\leftrightarrow(0)\leftrightarrow+1):1\}^K$;

The reciprocal asymmetric distribution is generated on the two sides of $\{D_0\}$ corresponding to the center zero: $\{x_{a1}x_{a2}\cdots x_{as}\}\neq\{x_{b1}x_{b2}\cdots x_{bs}\}$;

The circular logarithmic symmetry produces a reciprocal symmetrical distribution:

$$\sum_{(z\pm s+\eta a)}\{\eta_{a1}\cdots\eta_{aS}\}=\sum_{(z\pm s-\eta b)}\{\eta_{b1}\cdots\eta_{bS}\}$$

Or:

$$\sum_{(z\pm s+\eta a)}\{+\eta_{a1}^2+\cdots+\eta_{aS}^2\}=\sum_{(z\pm s-\eta b)}\{-\eta_{b1}^2-\cdots-\eta_{bS}^2\}$$

7.2. Satisfy the symmetry of the zero point of the center of the logarithm of the circle

Any function can decompose two symmetric circular logarithmic factors of resolution 2.

(7.2.1)

$|\Sigma_{(S=(a1,a2\cdots aS))}(1-\eta^2)^{+1}|=|\Sigma_{(S=(b1,b2\cdots bS))}(1-\eta^2)^{-1}|$;

(7.2.3)

$|\Sigma_{(\eta=(a1,a2\cdots aS))}(+\eta)|=|\Sigma_{(\eta=(b1,b2\cdots bS))}(-\eta)|$;

7.3. Solve the root

In the process of system calculus, the total elements ([S] and $\mathbf{D_0}$) are invariant groups. Once the boundary condition D is determined, the logarithm of the circle is determined and controlled to obtain the unique certainty of zero error (root element). According to probability $(1-\eta_H^2)=\{0 \text{ or } 1\}$, two symmetrical forms of center-zero symmetry are obtained.

(7.3.1)

$\{X_i\}=\{[(1-\eta_{a1}^2),\cdots(1-\eta_{aS}^2)];\ (1-\eta_0^2);\ [(1-\eta_{b1}^2),\cdots(1-\eta_{bS}^2)]\}\cdot\{D_0\}^{K(1)}$;

(7.3.2)

$\{X_i\}=\{(\eta_{a1},\eta_{a2},\cdots,\eta_{aS});\ (\eta_{b1},\eta_{b2},\cdots,\eta_{bS})\}\cdot\{D_0\}^{K(1)}$; ($\eta_0$ between elements);

(7.3.3)

$\{X_i\}=\{(\eta_{a1},\eta_{a2},\cdots,\eta_{aS});\ (\underline{\eta_0});\ (\eta_{b1},\eta_{b2},\cdots,\eta_{bS})\}\cdot\{D_0\}^{K(1)}$; ($\eta_0$ is among the elements);

If the central zero point cannot be found at one time, the root solution can be continuously searched in the next tree coding level $\{\eta_{a1}\eta_{a2}\cdots\eta_{aS}\}$ Category solution, until the remaining two elements get the symmetry root solution. At this point, all the parsing is done to get the root element parsing. Recognize patterns in the opposite way.

7.4、The principle of applying circular logarithms

The principle of applying circular logarithms

When a network node contains more element-aggregate group teams, the network transmission speed is faster. (Figure 6 is quoted from the online public account, and "Nature: 50 Years of Brain Space Navigation" expresses special thanks to the author). Explains that a neuron of an associative neural network can quickly transmit to the perception and parsing of each node of the overall network. **Figure 6 The transmission and interaction of neurons**

It expresses informationtransformation, interaction and balance.

In the three-dimensional three-dimensional five-dimensional spatial neural network, $\{X\}=\{q_{xyz}\}=\{x_1x_2x_3\cdots\}$ constitutes a toroidal neural network (torrus convex-concave function), $\{X\}=\{q_{uv}\}=\{x_4x_5\cdots\}$ constitutes a radial neural network . information(torrus convex-concave function),transformation, interaction and balance.

In the three-dimensional three-dimensional five-dimensional spatial neural network, $\{X\}=\{q_{xyz}\}=\{x_1x_2x_3\cdots\}$ forms a torus neural network $\{X\}=\{q_{uv}\}=\{x_4x_5\cdots\}$ transmission and interaction

Form a radial neural network.The said weight parameter $\{q_{(xyz+uv)}\}=\{X_j\omega_iR_k\}$ such as temperature, mechanics.Transport characteristics, material properties, etc. are represented by$\{\omega_i=\alpha,\beta,\gamma\cdots\}$, which are included in group variables and single variables. The circle logarithm has a closed group for all arbitrary functions (images), and the total elements[S]=[S,Q,M] are invariant groups, and the corresponding variable {X} obtains the mean value function (positive, medium, and inverse properties). modulo)$\{D_0\}^{K(Z)/t}$, it also has an invariant group, and the remaining operation is the calculation of the three-dimensional three-dimensional five-dimensional space circle logarithm$(1-\eta_{(xyz+uv)}{}^2)^{K(Z)/t}$, avoids the influence of inability to leave the element-clustering, and satisfies the zero-error calculation.

(7.4.1)

$\{X\}^{K(Z)/t}=(1-\eta_{(xyz+uv)}{}^2)^K\{D_0\}^{K(Z)/t}=\{0$：(0 到(1/2)到 1)：$1\}\cdot\{D_0\}^{K(Z)/t}$;

The information transmission of neural network values has self-organizing nodes and jump transitions between levels:

(7.4.2)

$(1-\eta_{(xyz+uv)}{}^2)^K\{D_0\}^{K(Z)/t}=\{0 \text{ or } 1\}\cdot\{D_0\}^{K(Z)/t}$;

The numerical value and network information transmission at the nodes of the neural network have self-organizing internal continuous transitions or equilibrium convergence transition points:

(7.4.3)

$(1-\eta_{(xyz+uv)}{}^2)^K\{D_0\}^{K(Z)/t}=\{(0 \text{ to } (1/2) \text{ to } 1)\}\cdot\{D_0\}^{K(Z)/t}$;

The circular logarithm can be converted into the chip architecture in a table or programming language, reflecting that each neuron of the neural network is correspondingly converted into the chip architecture through the calculation of "irrelevant mathematical model, no specific element content". It can avoid the defects of mode collapse and mode confusion of traditional computer programs, as well as the advantages of high computing power and high efficiency with robustness, security, and zeroerror.

8、The principle and application of circular logarithmic space image

8.1. Three-dimensional and five-dimensional space image processing principles

Image conversion principle: According to Brouwer's theorem, the center point represented by $\{X\}^K$ is equivalent to a perfect circle boundary.$(1-\eta^2)^K=\{0$：(0 to (1/2) to 1)：$1\}^K$ through the boundary of a perfect circle; convert it into a surface and a volume filled with arbitrary shapes and a surface and volume with an uneven shape. A three-dimensional space or plane image is formed through the symmetrical and synchronous expansion of the controllable center zero point within the boundary range.

The controllable "three-dimensional three-dimensional five-dimensional space neural network" network node in the program $\{D_0\}\leftrightarrow(1-\eta_{(\text{normal body})}{}^2)$ perfect circle $\leftrightarrow(1-\eta_{(\text{ellipse})}{}^2)$ ellipse (body) $\leftrightarrow(1-\eta_{(\text{arbitrary body})}{}^2)$ A face (body) of any shape. The opposite is also true.

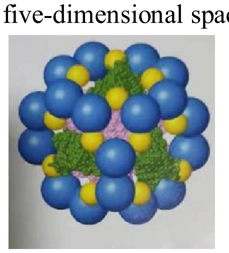
8.2, image processing application example

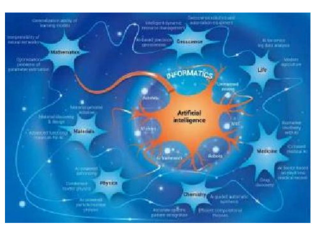
In 2021, the operation case of the Second Hospital of Zhejiang University is to use a 0.1mm surgical robot to place 100 electrode needles on two 4_{mm}×4_{mm} chips and send them to the established fifth layer deep in the brain. cell location. Acquire the intelligence of recognition and perception neurons, and replace the hemiplegic neurons to restore movement consciousness.

Algebraic models (polynomials) can be applied to explain: the brain has 10^{12} neurons, which form three layers of multi-level and multi-regional structures. Three-dimensional three-dimensional five-dimensional equation for the implantation of 100 electrode needle chips and neuron connections $\{X_{xp}{}^{10}\}^2=(1-\eta^2)\cdot\{D_{0xp}\}^{K(Z\pm[S]\pm(N)\pm(m)\pm q))/t}$。$\{X_{DN}{}^{10}\}$, $\{D_{0DN}\}$ and $\{X_{xp}{}^{10}\}$, $\{D_{0xp}\}$are the unknown network function and the known network function, respectively. Implantation of a chip supervises the control of hemiplegic neurons and brain consciousness.

(Image source: According to an online report on November 19, 2021: An operation case at the Second Hospital of Zhejiang University).

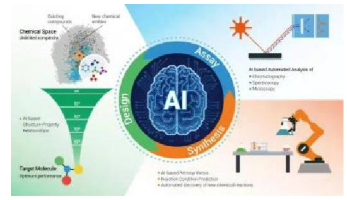
8.3、Universal application of circular logarithm-three-dimensional three-dimensional five-dimensional space neural network

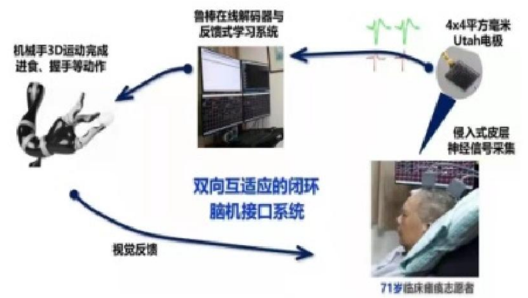




In the three-dimensional three-dimensional five-dimensional spatial neural network, $\{X\}=\{qxyz\}=\{x1x2x3\cdots\}$ constitutes a circular neural network, and $\{\{X\}=\{q_{xyz}\}=\{x_1x_2x_3\cdots\}$ constitutes a radial neural network. (Image source: Internet public account).

High-dimensional perfect sphere network; High-dimensional neural network; High-dimensional biological gene





High-dimensional turbine blade network; High-dimensional planetary network; High-dimensional artificial intelligence

Three-dimensional high-dimensional neural network is used in many scientific fields such as mathematics, physics, astronomy, chemistry, biology, etc., to establish calculus-cluster set equations, and map them to circular logarithmic neural networks and tables, in $(1-\eta^2)^K=\{0 \text{ to } 1\}^K$ cognition and analysis.

(8.3.1)

$$\{x\pm^{KS}\sqrt{D}\}^{K(Z)/t}\leftrightarrow(1-\eta^2)\cdot\{x_0\pm D_0\}^{K(Z)/t};$$

(8.3.2)

$$(1-\eta^2)^K=\{0:\ [0\leftrightarrow(1/2)\leftrightarrow1]:\ 1\}^{K(Z)/t};$$

Where: circle logarithm$(1-\eta^2)^K=\{0: (0 \text{ to } (1/2) \text{ to } 1): 1\}^K$ The function can be converted into the operating language of the computer program.

The circle logarithm $(1-\eta^2)^K=\{0 \text{ or } 1\}^K$ simultaneously represents the boundary or center zero point of the circle logarithm and the corresponding electronic circuit switch.

The center zero point $(1-\eta^2)^K=\{1/2\}^K$ is the symmetrical balance transition point of the two neurons corresponding to the logarithm of the circle (the bright spot in the figure),

9、Digital application example

For the convenience of understanding, taking the general solution of the so-called century-old mathematical problem "quintic equation" as an example (including the unification of discrete-entanglement calculations), a verifiable, reliable, concise, and zero-error calculation is proposed. Due to circular log isomorphism, it can be shown that generalization to arbitrary higher-order computational methods, and thus to arbitrary higher-order calculus and clustering set equations for arbitrary systems:

Known conditions: The number of power dimension elements **S=5** is always unchanged; the average value $\mathbf{D_0=12}$; it is an invariant group; the boundary function **D**, the combination coefficient: **1:5:10:10:5:1**, the sum of the coefficients: $\mathbf{\{2\}^5=32}$; (m represents the upper and lower limits of element change).

Through this calculation example, it is convincingly proved that:

(1). The traditional calculus univariate (x) and other order multivariate mean function $\{X_0\}$ becomes an invariant group.

(2). There are various combinations of uncertainties in { $\mathbf{D}_0$}, the boundary function **D** is determined by the controllable circle logarithm $(1-\eta^2)^K$, and conversely, the boundary function **D** determines the circle logarithm $(1-\eta^2)^K$ state.

(3). The traditional calculus cannot deal with the problem of the relationship between $\{\mathbf{D_0}\}$ and **D**, which will be solved here.

The power function**K(5)/t=**K(Z±(S=5)±(N=0,1,2)±(m)±(q=5))/t controls the depth and breadth of the five-dimensional fundamental group.

[Example 1]: Select the discrete zero-order boundary condition: $D=\{248832\}^{K(5)/t}=(^5\sqrt{248832})^{K(5)/t}$;

[Example 2]: Select the first-order calculus boundary condition: $D=\{79002\}^{K(5))/t}=(^5\sqrt{79002})^{K(5)/t}$;

[Example 3]: Select second-order calculus boundary conditions: $D=\{7962624\}^{K(5))/t}=(^5\sqrt{7962624})^{K(5)/t}$;

9.1、 [Example 1]: Discrete quintic equation

9.1.1. Discrete neutral calculus equation (zero-order calculus equation) $(1-\eta^2)^K=1$;

Boundary function:

$\mathbf{D}=\{12\}^5=(^5\sqrt{248832})^{,K[(S=5)\pm(N=0)\pm(q=0\leftrightarrow5)]}$;

Power function:

K(5)/t=K(Z±(S=5)±(N=0,1)±(m)±(q=0↔5))/t; (m represents the upper and lower limits of element change).

Features: invariant group(S=5),$\mathbf{D}_0$=12; ((K=+1,0,-1 property area), central function, discrete big data statistics),

Discriminant:$(1-\eta^2)^{K(\pm1,\pm0)}=[^5\sqrt{\mathbf{D/D_0}}]^{(\pm1,\pm0)}=\{248832/248832\}^{(\pm1,\pm0)}=\{^{K5}\sqrt{248832/12}\}^{(+5)}=1$;

Discrimination result:$(1-\eta^2)^{K(\pm0,\pm1)}=\{1 \text{ or } 0\}$, (±1,±0); discrete neutral (positive and negative, conversion) big data calculation.

Calculus equation (±N=0) Zero order calculus equation, neutral region function or forward and reverse transformation or rotation function:

(9.1.1)

$\{x\pm\sqrt{\mathbf{D}}\}^{\mathbf{K[}(S=5)\pm(N=0,1,2)\pm(q=0\leftrightarrow5)]/t}$
$=Ax^{(q=5)}+Bx^{(q=4)}+Cx^{(q=3)}+Dx^{(q=2)}+Ex^{(q=1)}+\mathbf{D}$
$=x^{(q=5)}\pm60x^{(q=4)}+1440x^{(q=3)}\pm17280x^{(q=2)}+103680x^{(q=1)}\pm(^5\sqrt{248832})^{(q=5)}$
$=(1-\eta^2)[x^5\pm5\cdot12\cdot x^4+10\cdot12^2\cdot x^3\pm10\cdot12^3\cdot x^2+5\cdot12^4\cdot x^1\pm12^5]$
$=[(1-\eta^2)\cdot\{x_0\pm12\}]^{\mathbf{K[}(S=5)\pm(N=0,1,2)\pm\pm(q=0\leftrightarrow5)]/t}$
$=[(1-\eta^2)\cdot\{0,2\}\cdot\{12\}]^{\mathbf{K[}(S=5)\pm(N=0,1,2)\pm(q=0\leftrightarrow5)]/t9}$;

9.1.2、**Equation result**

(1), balance $(1-\eta^2)=1$、(K=±1) (neutral function), two-dimensional axis rotation, annular space, vector subtraction;

(9.1.2)

$\{x-^5\sqrt{\mathbf{D}}\}^{\mathbf{K}[(S=5)\pm(N=0,1,2)\pm(q=0\leftrightarrow5)]/t}=[\{0\}\cdot\{12\}]^{\mathbf{K}[(S=5)\pm(N=0,1,2)\pm(q=0\leftrightarrow5)]/t}$;

(2), balance $(1-\eta^2)=1$、(K=+1),

three-dimensional axis precession and radiation , vector addition;

(9.1.3)

$\{x+^5\sqrt{\mathbf{D}}\}^{\mathbf{K}[(S=5)\pm(N=0,1,2)\pm(q=0\leftrightarrow5)]/t}=[2\cdot12]^{K[(S=5)\pm(N=0,1,2)\pm(q=0\leftrightarrow5)]/t}$;

(3), Equilibrium $(1-\eta^2)=1$、(K=±1), the radiation and motion of the periodic spiral space of the five-dimensional basic space of neutral photons;

(9.1.4)

$\{x\pm^5\sqrt{\mathbf{D}}\}^{\mathbf{K}[(S=5)\pm(N=0,1,2)\pm(q=0\leftrightarrow5)]/t}=[(0\leftrightarrow2)\cdot\{12\}]^{K[(S=5)\pm(N=0,1,2)\pm(q=0\leftrightarrow5)]/t}$;

(4), balance $(1-\eta^2)^K=0$、(K=±0) center zero symmetry expansion, balance conversion;

(9.1.5)

$\{x-^5\sqrt{\mathbf{D}}\}^{\mathbf{K}[(S=5)\pm(N=0,1,2)\pm(q=0\leftrightarrow5)]/t}=[\{0\}\cdot\{12\}]^{K[(S=5)\pm(N=0,1,2)\pm(q=0\leftrightarrow5)]/t}$;

(5), balance$(1-\eta^2)=0$、(K=±1,±0), center zero symmetrical point, tree code decomposition point.

(9.1.6)

$\{x\pm^5\sqrt{\mathbf{D}}\}^{\mathbf{K}[(S=5)\pm(N=0,1,2)\pm(q=0\leftrightarrow5)]/t}=\{0\}^{\mathbf{K}[(S=5)\pm(N=0,1,2)\pm(q=0\leftrightarrow5)]/t(q=0\leftrightarrow5)]/t}$;

9.2、[Example 2]: Convergent quintic equation

±N=1, (1- η 2)(+1)≤1, the calculus time represents the state.

9.2.1. Convergent entangled first-order calculus equation: $\pm N=1,(1-\eta^2)^{(+1)}\leq1$;

Boundary function:$\mathbf{D}=\{12\}^5=(^5\sqrt{79002})^{K[(S=5)\pm(N=0,1)\pm(q=1\leftrightarrow5)]}$;

Power function:

K(5)/t=K(Z±(S=5)±(N=0,1)±(m)±(q=1↔5))/t; (m represents the upper and lower limits of element change).

Features: Invariant group $(S=5)$,$\mathbf{D}_0=12$;

$(K=+1,0,-1$ property area),

Discriminant:$(1-\eta^2)^{K(+1)}=[^5\sqrt{\mathbf{D}/\mathbf{D}_0}]^{K(+1)}=\{79002/248832\}^{(+1)}=\{^{K5}\sqrt{79002/12}\}^{(+5)}\leq 1$;

Discrimination result: $(1-\eta^2)^{K(+1)}\leq 1$, belonging to convergent big data entanglement calculation, positive function),

The calculus equation $(\pm N=0,1)$ is a first-order calculus equation, which is a convergent and decaying function; $d\{x\pm^5\sqrt{\mathbf{D}}\}^{\mathbf{K}[(S=5)\pm(N=0)\pm(q=1\leftrightarrow 5)]/t}$; or $\int\{x\pm^5\sqrt{\mathbf{D}}\}^{\mathbf{K}[(S=5)\pm(N=-1)\pm(q=1\leftrightarrow 5)]/t}dx$;

(9.2.1)

$\{x\pm\sqrt{\mathbf{D}}\}^{\mathbf{K}[(S=5)-(N=0,1)\pm(q=1\leftrightarrow 5)]/t}$

$=\underline{Ax}^{(q=5)}[\pm Bx^{(q=4)}+Cx^{(q=3)}\pm Dx^{(q=2)}+Ex^{(q=5)}=^{\mathbf{5}}\sqrt{\mathbf{D}}^{(q=4)}]^{\mathbf{K}}\pm\underline{\mathbf{D}}$

$=x^{(q=5)}[\pm 60x^{(q=4)}+1440x^{(q=3)}\pm 17280x^{(q=2)}+(^{\mathbf{5}}\sqrt{\mathbf{79002}})^{\mathbf{K}}{}^{(\mathbf{q=4})}]^{\mathbf{K}}\pm\underline{\mathbf{D}}$

$=[(1-\eta^2)\cdot\{x_0\pm 12\}]^{\mathbf{K}((S=5)\pm(N=0,1,2)\pm(q=1\leftrightarrow 5)]/t}$

$=[(1-\eta^2)\cdot\{0,2\}\cdot\{12\}]^{\mathbf{K}((S=5)\pm(N=0,1,2)\pm(q=1\leftrightarrow 5)]/t}$;

9.2.2、Calculation result of convergent entangled calculus equation:

(1), represents convergent equilibrium, two-dimensional rotation, transformation, and vector subtraction.

(9.2.2)

$\{x-^5\sqrt{\mathbf{D}}\}^{\mathbf{K}((S=+5)\pm(N=0,1)\pm(q=1\leftrightarrow 5)]/t}=[(1-\eta^2)\cdot\{0\}\cdot\{12\}]^{\mathbf{K}((S=5)\pm(N=0,1)\pm(q=1\leftrightarrow 5)]/t}=0$;

(2) Indicates convergent balance, three-dimensional axis precession, radiation, and vector addition.

(9.2.3)

$\{x+^5\sqrt{\mathbf{D}}\}^{\mathbf{K}((S=+5)\pm(N=0,1)\pm(q=1\leftrightarrow 5)]/t}=[(1-\eta^2)\cdot\{2\}\cdot\{12\}]^{\mathbf{K}((S=5)\pm(N=0,1)\pm(q=1\leftrightarrow 5)]/t}$;

(3), represents the periodic expansion of the convergent five-dimensional basic vortex space.

(9.2.4)

$\{x\pm^5\sqrt{\mathbf{D}}\}^{\mathbf{K}((S=5)\pm(N=0,1)\pm(q=1\leftrightarrow 5)]/t}=(1-\eta^2)^{(+1)}[0\leftarrow\{32\cdot 12^5\}\rightarrow 0]^{\mathbf{K}((S=5)\pm(N=0,1)\pm(q=1\leftrightarrow 5)]/t}$;

9.3、[Example 3]: Second-order diffusivity quintic equation ;

9.3.1. Second-order calculus equation of diffusive entanglement: $(1-\eta^2)^{(-1)}\leq 1$;

Boundary function:

$\mathbf{D}=\{12\}^5=(^5\sqrt{7962624})^{K[(S=5)\pm(N=0,1,2)\pm(q=2\leftrightarrow 5)]}$;

Power function:

$K(5)/t=K(Z\pm(S=5)\pm(N=0,1)\pm(m)\pm(q=2\leftrightarrow 5))/t$; (m represents the upper and lower limits of element change).

Features: Invariant group$(S=5)$,$\mathbf{D}_0=12$;

$(K=+1,0,-1$ property area),

Discriminant:

$(1-\eta^2)^{K(-1)}=[^5\sqrt{\mathbf{D}/\mathbf{D}_0}]^{K(-1)}=\{7962624/248832\}^{(-1)}=\{^{K5}\sqrt{7962624/12}\}^{(-1)}\leq 1$; Discrimination result: $(1-\eta^2)^{K(-1)}\leq 1$, which belongs to diffusive big data entanglement calculation.

Calculus equation$(\pm N=0,1,2)$ Second-order calculus equation, (1-η2)(-5)=≤1, expansion and growth function;

$\partial^2\{x\pm^5\sqrt{\mathbf{D}}\}^{\mathbf{K}[(S=5)\pm(N=0)\pm(q=0\leftrightarrow 5)]/t}$; or $\partial\{x\pm^5\sqrt{\mathbf{D}}\}^{\mathbf{K}[(S=5)-(N=-1)-(q=1\leftrightarrow 5)]/t}$;

$\int^2\{x\pm^5\sqrt{\mathbf{D}}\}^{\mathbf{K}[(S=5)+(N=-2)+(q=2\leftrightarrow 5)]/t}dx^2$; or $\int\{x\pm^5\sqrt{\mathbf{D}}\}^{\mathbf{K}[(S=5)+(N=-1)+(q=1\leftrightarrow 5)]/t}dx$;

(9.3.1)

$\{x\pm^5\sqrt{\mathbf{D}}\}^{K[(S=5)-(N=0,1,2)\pm(q=0\leftrightarrow 5)]}$

$=Ax^{(-5)}+Bx^{(-4)}+Cx^{(-3)}+Dx^{(-2)}+Ex^{(-1)}+\mathbf{D}$

$=x^5\pm 60x^4+1440x^3\pm 17280x^2+103680x^1\pm 7962624$

$=(1-\eta^2)^{(-5)}\cdot[x^{(-5)}\pm 5\cdot 12\cdot x^{(-4)}+10\cdot 12^2\cdot x^{(-3)}\pm 10\cdot 12^3\cdot x^{(-2)}+5\cdot 12^4\cdot x^{(-1)}\pm 12^{(-5)}]^{(-1)}$

$=[(1-\eta^2)\cdot\{x_0\pm 12\}]^{K(S=5)\pm(N=0,1,2)\pm(q=2\leftrightarrow 5)]/t}$;

$=[(1-\eta^2)\cdot\{0,2\}\cdot\{12\}]^{K(S=5)\pm(N=0,1,2)\pm(q=2\leftrightarrow 5)]/t}$;

9.3.2、Calculation result of diffusively entangled quintic equation:

(1), indicating diffusion balance, two-dimensional rotation, transformation, and vector subtraction;

(9.3.2)

$\{x-^5\sqrt{\mathbf{D}}\}^{K(S=5)\pm(N=0,1,2)\pm(q=2\leftrightarrow 5)]/t}=[(1-\eta^2)\cdot\{0\}\cdot\{12\}]^{\mathbf{K}(-5)/t}=0$;

(2). Indicates diffusivity balance, three-dimensional axis precession, radiation, vector addition, and combination.

(9.3.3)

$\{x+^5\sqrt{\mathbf{D}}\}^{K(S=5)\pm(N=0,1,2)\pm(q=2\leftrightarrow 5)]/t}=[(1-\eta^2)\cdot\{2\}\cdot\{12\}]^{(-5)/t}$;

$=(1-\eta^2)^{K(S=5)\pm(N=0,1,2)\pm(q=2\leftrightarrow 5)]/t}\cdot 7962624$;

(3) .It represents the spatial periodic diffusion of the diffusive five-dimensional basic vortex (rotation + precession).

(9.3.4)

$\{x\pm^5\sqrt{\mathbf{D}}\}^{K(S=5)\pm(N=0,1,2)\pm(q=2\leftrightarrow 5)]/t}$

$=(1-\eta^2)^K\cdot[0\leftarrow\{32\cdot 12^5\}\rightarrow 0]^{K((N=0,1,2)\pm(q=0\leftrightarrow 5)]/t}$

$=\{0\leftrightarrow 7962624\leftrightarrow 1\}^{K((N=0,1,2)\pm(q=0\leftrightarrow 5)]/t}$;

9.4、Parsing and composition of roots:

[Example 5]: The above three examples of "quintic equation" have the same elements - the number of clusters $(S=5)$ and the mean function (positive, medium and inverse eigenmodes) $\{\mathbf{D}_0\}^K$: $B=S\mathbf{D}_0=60$ is a deterministic invariant group; based on different boundary functions $\mathbf{D}$, a deterministically controllable $(1-\eta^2)^K\leq 1$ is formed; according to the principle of circular logarithmic isomorphism and the center zero, it is the most convenient to choose a zero-order polynomial The second coefficient$Bx^{(Z\pm[S]\pm N\pm(q=-1)}=\{x\cdot D_0\}^{(Z\pm[S]\pm N\pm(q=1)}=60$; center zero point $\mathbf{D}_0=12$, evaluate Between $\{x_1x_2x_3\}$ and$\{x_4x_5\}$.$(1-\eta^2)B=(79002/248832)\cdot 60=0.317491=19/60$; $\eta^2=17/60$ formed by the center zero.If: the test does not satisfy the symmetry, try again: η^2=17/60 (to satisfy the equilibrium symmetry).

Left-right symmetry based on circular logarithmic factor: get

(9.4.5)

$(1-\eta^2)B$

$=[(1-\eta_1^2)+(1-\eta_2^2)+(1-\eta_3^2)]-[(1-\eta_4^2)+(1-\eta_5^2)]\cdot 60$

$=[(1-9/12)+(1-5/12)+(1-3/12)]-[(1+7/12)+(1+10/12)]\cdot 60$

$=\underline{(17/60)-(17/60)}=0$;(满足圆对数因子左右对称)。

Get the calculus equation element-cluster root element analysis, and vice versa for the root combination:

(9.4.6)

$x_1=(1-\eta_1^2)\mathbf{D_0}=(1-9/12)12=3$;

$x_2=(1-\eta_2^2)\mathbf{D_0}=(1-5/12)12=7$;

$x_3=(1-\eta_3^2)\mathbf{D_0}=(1-3/12)12=9$;

$x_4=(1+\eta_4^2)\mathbf{D_0}=(1+7/12)12=19$;

$x_5=(1+\eta_5^2)\mathbf{D_0}=(1+10/12)12=22$;

Continue to analyze and combine the multi-parameter and heterogeneity of the pattern recognition cluster set

$(x)=(x_\omega)=(x_j\omega_i R_k)=(1-\eta_\omega^2)=(1-\eta_{\omega i}^2)(1-\eta_{xj}^2)(1-\eta_{Rk}^2)$,

(9.4.7)

$x_1=(1-\eta_1^2)(1-\eta_{\omega 1}^2)\mathbf{D_0}=3_{\omega 1}$;

$x_2=(1-\eta_2^2)(1-\eta_{\omega 2}^2)\mathbf{D_0}=7_{\omega 2}$;

$x_3=(1-\eta_3^2)(1-\eta_{\omega 3}^2)\mathbf{D_0}=9_{\omega 3}$;

$x_4=(1+\eta_4^2)(1-\eta_{\omega 4}^2)\mathbf{D_0}=19_{\omega 4}$;

$x_5=(1+\eta_5^2)(1-\eta_{\omega 5}^2)\mathbf{D_0}=22_{\omega 5}$;

To become interpretable cognition, supervised learning, parsing, derivation:

Verification: (Satisfy balanced, symmetrical formulas)

(1)、

$\mathbf{X}=(3\cdot 7\cdot 9\cdot 7\cdot 19)=79002$(satisfy the symmetry$\mathbf{D}$);

(2)、

$\{x-\sqrt{\mathbf{D}}\}^5=[(1-\eta^2)\{0\}\{x_0\pm 12\}]^5$

$=(1-\eta^2)[12^5-5\cdot 12^5+10\cdot 12^5-10\cdot 12^5+5\cdot 12^5-79002]$

$=0$;

((Satisfy balanced, symmetrical formulas)

Discussion:

The relative symmetry of the center zero point for the composition of two uncertain elements satisfies the symmetry of the circular logarithm factor {1/2}:

$$x_A=(1-\eta)\mathbf{D_0};\qquad x_B=(1+\eta)\mathbf{D_0};$$

The same "η" here corresponds to $\sum(+\eta)=\sum(-\eta)$ or $\sum(1-\eta^2)^{(+1)}=\sum(1-\eta^2)^{(-1)}$ or$\prod(1-\eta^2)^{(+1)}=\prod(1-\eta^2)^{(-1)}$, which are two deterministic, stable, symmetrical circular logarithmic factors Perform covariance transformations. x_A and x_B form $x_{AB}=(1-\eta^2)\mathbf{D}_0^2$ elliptic function with long axis and short axis.

If it is a circular logarithmic factor then the corresponding element. When the circular function composed of more than three (more) elements becomes a central ellipse and an eccentric ellipse. According to the three (multiple) circular log factor groups, decompose the two groups of symmetric factors at the next level into asymmetric combination factor groups. Continue to decompose the multi-combination group factors separately until the last two circular logarithmic factors are left to form symmetry, and all univariate elements are obtained by analysis. The reverse operation is the perfect circle pattern recognition, which combines and recognizes the mean function from the known univariate elements.

10、Contemporary physics, astronomy

life sciences, information coding, homogeneous and non-uniform, symmetric and asymmetric, sparse and dense, fractal and chaos, discrete and entangled phenomena of complex multi-body systems, traditional calculus-pattern recognition methods addressed by artificial intelligence It encounters difficulties in realizing the unity of "discrete and entangled", "completeness and compatibility".

Arbitrary functions are mostly "multiplication and addition reciprocity" combination, obtain invariant mean function, optimize the composition of high-order calculus equation, unified mapping to controllable "irrelevant mathematical model, no specific element content" three-dimensional solid five-dimensional space Neural networks, giving new life to a novel calculus equation - pattern recognition. Written as a unified formula:

(10.1)

$W=(1-\eta^2)\cdot W_0^{K(Z)/t}$;

(10.2)

$(1-\eta^2)=\{0:[0\text{ to}(1/2)\text{ to}1]:1\}^{K(Z)/t}$;

Group Combination-Circular Logarithm is a stable, independent, novel, secure, efficient, and high-computing algorithm that accommodates the characteristics of complex multi-body systems. In this way, the complex multi-body system performs forward and reverse "analytic-transformation-cognition" respectively. in:

The advantages of the perfect circle mode: the existing mode recognition has interface mode, and the ellipse mode does not deal with the inhomogeneity of the element-set class distribution in time, which makes the center zero movement inconsistent with the curvature change of the boundary curve. Through the weight parameter circle logarithm, the The asymmetric distribution is a relatively symmetrical distribution, which satisfies the coincidence of the center zero position and the curvature of the boundary curve, and the covariance of the angle change and the curve. The complex programming language is simplified, and the high-order calculus equations composed of it are converted into circular logarithms. The cognitive and recognition supervised learning has reliable interpretability.

Advantages of novel higher-order calculus equations:

(1). Integrate classical algebra and logical algebra into a unified "group combination-circular logarithm" to form a unified cognition and analysis of high-order calculus equations for artificial intelligence. Expand the new concepts and functions of mathematics. Such as: mathematical functional analysis, finite element method, matrix calculation; logical algebra (Jacob Lurie); category theory; Fisher of interactive information describes information encoding and decoding with information; stochastic dynamics, etc., can be optimized into controllable circle pairs Numbers $\{0:[0\leftrightarrow(1/2)\leftrightarrow 1]:1\}$ or $\{0:[-1\leftrightarrow(0)\leftrightarrow +1]:1\}^K$ Recognition and interpretation of zero error.

(2) .Improve computer functions: replace "interface mode and ellipse mode" with "perfect circle mode" to form high-order calculus equations to overcome "approximation calculation" and mode collapse and mode confusion. Effectively unify "artificial intelligence-quantum computing-semiconductor (connecting people, robots)" etc. into a neural network circular logarithm, cognition with zero error in $\{0\text{to }1\}^K$ with parsing. (Finish)

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