宇宙分维构造及其数学基础

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摘　要：探讨了宇宙分维构造的形式，给出了分维微积分及分形测度的数学基础，包括分维导数及分维微积分的表述形式、分维微分方程的规整空间积分解、分形测度的分维微积分定义及自相似分形的测度计算方程。作为诠释，探讨了原子核内中子与质子的趋势关系方程，以及其周期解和原子序数极限值。

关键词：宇宙，分维构造，分维微积分，分维微分方程，分形测度，原子序数极限

Fractal dimension structure of Cosmos and its mathematical foundations

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Abstract　Fractal dimension structure of the Cosmos are explored, and the mathematical foundation, which include the expressions of fractal dimension differential and calculus, regular space integral solutions of fractal dimension differential equations, the fractal calculus definitions of fractal measure as well as the measure computational equation of self-similar fractal, fractal dimension calculus and fractal measure are given. As annotation, an equation of the relation between neutrons and protons in nuclei and its periodical solutions as well as atomic number limit are discussed.

Keywords　Cosmos, fractal dimension structure, fractal dimension calculus, fractal differential equation, fractal measure, atomic number limit

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http://www.nature.ac.cn/report/paper-pdf/cosmosandmaths-pdf.pdf

关于超光速与量子分形的能量交换描述方法

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摘要：将真空作为一种介质考虑，初步表明真空存在若干层面与之相互作用的背景、能够阻隔或快速传递特定形式的机械振动及真空存在固有频率振荡（或真空荡漾），通过对光速守恒、能量交换方程及 Karman 涡街旋涡脱落波长方程的讨论，给出双程光速守恒的单程光速方程、光子闭弦模式构造的实验判据方程（同旋面光子一般性折射方程）、粒子超光速运动、波粒二象性的粒子分形运动介质作用方程及量子分形的表述形式。结果表明，基于能量交换方程，能够确立既包含超光速运动，同时又融合 Einstein 狭义相对论及量子理论有关结论的一致性描述方法。

关键词：单程光速方程，一般性折射方程，介质作用方程，超光速，量子分形，能量交换，粒子分形运动

Energy-exchange descriptions on the superluminal velocity and quantum fractal

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Abstract　In this paper, consider taking the vacuum as a form of medium, which preliminary shows that the vacuum has the backgrounds at the several levels interaction each other, and it can block or quickly transfer the specific mechanical vibration, and the vacuum has the natural frequency oscillation (or the vacuum ripple), by exploring the constancy of light velocity in the vacuum, energy-exchange equation and vortex shedding wavelength equation in Karman vortex-street, expressional forms of equation of the one-way velocity of light (also equation of the one-way speed of light, or equation of one-way variable speed of light) for the constancy of the two-way velocity of light (or constancy of the two-way speed of light), experimental criterion equation for the closed strings model of the photon (general refraction equation of the photon with one same rotation plane), superluminal (also faster-than-light or FTL) velocity, medium action equation of particle fractal motion for the wave-particle duality, and quantum fractal are studied deeply. As a result, it shows that a tentative theoretical frame which includes not only the superluminal-velocity motion but consists with Einstein special relativity and quantum theory can be established.

Keywords equation of one-way velocity of light, general refraction equation, medium action equation, superluminal velocity, quantum fractal, energy exchange, particle fractal motion

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天体运行的介质层壳与离散轨道引论

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摘 要：采用介质层壳弯曲的唯象方法，在规整三维空间中给出了能量方程及物体间的能量引力形式表述，其引力方程的二个条件解分别与 Newton 引力理论及 Einstein 引力理论的有关结果相近。讨论了目前分维微积分在函数方面的局限性，给出了相似扩展方程，随后通过讨论天体运行轨道的基线扩展特征，给出了天体运行的离散轨道方程，并以太阳系行星及部分卫星为例，给出了这些天体运行离散轨道方程的具体表述形式。

关键词：介质层壳弯曲，离散轨道方程，能量方程，分维微积分的局限，相似扩展方程，分维扩展

Introductions on the medium shell and discrete orbits of celestial bodies motion

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Abstract By using phenomenological method for the medium shell curve, an energy equation on three dimensions regular space and an energy-gravitation form about gravitational interaction between bodies are given. Further more, two condition solutions of the gravitational expression is close by with the results of Newton's gravitational theory and Einstein's general relativity respectively. The localizations in the functions of the fractal dimension calculus compared with the fractional-order calculus at present are discussed, and similar expanded equation is given. Subsequently，by discussing the expanded baseline property on the celestial motion orbit, discrete orbital equations of the celestial bodies motion are given. And referring to the related orbital data of planets and some satellites in the Solar System, the concrete expression on the discrete orbit of the celestial bodies motion are given too.

Keywords medium shell curve, discrete orbital equation of celestial bodies motion, energy equation, localization of fractal dimension calculus, similar expanded equation, fractal dimension expanded

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http://www.nature.ac.cn/papers/paper-pdf/celestial-pdf.pdf

天体运行轨道的一般性 Binet 方程形式

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摘 要：通过讨论已有质速关系的方程形式，给出质速关系的等效极坐标方程及其 Binet 方程，进而给出质速关系及质能关系的几个较为具体的方程形式，包括超光速运动形式。随后应用质能关系探讨介质层壳弯曲方法中能量方程解的一般形式，给出天体运行轨道的一般性 Binet 方程及其在弱场、强场时的近似解表述，给出行星近日点进动、光线弯曲的解析分析。

关键词：天体运行轨道，质速关系方程， Binet 方程，近日点进动，光线弯曲，引力频移

The general expression of Binet equation about celestial bodies motion orbits

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Abstract By discussing the existent equations of mass-velocity relation, an equivalent polar coordinate equation and its Binet equation of the mass-velocity relation are given, and expressions of the mass-velocity relation and mass-energy relation are given too, which include forms of superluminal (also faster-than-light or FTL) motion.

Subsequently, using the mass-energy relation, the general expression of the solution of the energy equation on the medium shell curve method is discussed, and general expression of Binet equation and its approximate solutions about orbits of the celestial bodies motion in weak and strong gravitational field are given. Further more, analysis solutions of the advance of the perihelion of planets and bending of light for the gravitational force are given.

Keywords orbit of the celestial bodies motion, equations of mass-velocity relation, Binet equation, superluminal motion, advance of the perihelion of planets, bending of light, gravitational frequency shift

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地球空间稳定核素的趋势分析方程与物质的超光速运动规律

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摘 要：通过讨论地球空间已有稳定核素内质子数与中子数的分布趋势，介绍了稳定核素的趋势分析方法及其有关周期性分布方程形式，给出了理论方程曲线与地球空间稳定核素实验数据分布点的对比结果，进而给出了稳定核素极限值和元素周期表中化学元素极限，以及其与正负粒子对的可能对应关系方程，包括位于电子中微子层面附近的粒子质量量级初步估计及粒子质量的趋势性分布方程（具有稠密分布在部分闭区间与稀疏分布在少数开区间的特征）。随后通过建立真空物质能量状态的二个假设，及基于等效 Binet 方程，给出了与 Einstein 狭义相对论有关结论相融合的物质粒子以光速及超光速运动的质量及能量方程；作为推论，对这些方程与暗物质及暗能量的可能对应关系予以了初步探讨。

关键词：稳定核素，趋势分析方程，周期性规律，化学元素极限，粒子质量分布，真空物质能量状态，超光速运动方程

The tendency analytical equations of stable nuclides and the superluminal velocity motion laws of matter in geospace

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Abstract In this paper, by discussing the existent distribution trend of relation for the proton number and the neutron number to be included by the stable nuclides in geospace, tendency analytical method and it's periodic distribution equation forms of the stable nuclides are expressed at first. Then a comparison result between the curve of the theoretical equation analysis and the points of the experimental distribution data of the stable nuclides in geospace are given. Further more, stable nuclide limit and chemical element limit for the chemical element periodic table are given, and possible corresponding relation equation with the positron-particle annihilation is expressed, which includes estimation of order of the static mass to be situated nearby at the electron neutrino structural dimension and a tendency distribution equation (with the characteristics of dense distribution in the partial closed intervals and sparse distribution in the few open intervals) of the particles mass. Subsequently, by forming two hypotheses about energy state of vacuum matter, and basing on an equivalent Binet's equation, mass equations and energy equations of the partial moving with light-velocity or superluminal (also faster-than-light or FTL) velocity motion fusing with the results of Einstein special relativity are expressed. As inference, possible corresponding relations between the mass equations and energy equations with the dark matter and dark energy are discussed tentatively.

Keywords stable nuclide, tendency analytical equation, periodic law, chemical element limit, tendency distribution of the particles mass, energy state of vacuum matter, equations of superluminal velocity motion

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天体运行轨道的背景介质理论导引与自相似分形测度计算的分维微积分基础

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摘 要：通过讨论天体运行背景介质理论的连续轨道及离散轨道这二个研究方向的基础假设，介绍了天体运行轨道的具体方程形式及理论框架概要；进一步地通过讨论天体运行轨道 Binet 方程的一般形式及其行星近日点进动角的解，给出了连续轨道理论与 Newton 理论及 Einstein 广义相对论的联系与区别；通过讨论天体运行轨道的分维扩展方程，给出了包括太阳系行星、天王星卫星、地球卫星、绕月航天器等在内的离散轨道（稳定性轨道）方程及其预言数据。特别地，作为对天体在较为广泛区域作用曲线的初步探讨推论，指出仅由天体引力难以形成质量密度趋于无穷大的理想黑洞。通过讨论函数的分维导数的位置假设及幂函数的分维导数的形式假设，进一步明晰了幂函数的分维导数、分维微分及分维积分的具体方程形式，给出分维导数与分数阶导数的区别，探讨了自相似分形扩展与分维扩展的差分方程描述方法，随后讨论了基于一般分形测度的非整数阶微积分定义导出的自相似分形测度趋势性微积分方程具体形式，给出了其与目前 Hausdorff 测度方法（覆盖方法）的区别，并对包括三分 Cantor 集合、Koch 曲线、Sierpinski 垫片及正交十字星形等自相似分形在内的测度进行了计算分析，最后探讨了一种理想点集的维数及测度计算方程。

关键词：天体运行轨道，背景介质理论，连续轨道，离散轨道，自相似分形测度，非整数阶微积分，分数阶微积分，分维微积分

Introduction on background medium theory about celestial body motion orbit and foundation of fractional-dimension calculus about self-similar fractal measure calculation

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Abstract In this paper, by discussing the basic hypotheses about the continuous orbit and discrete orbit in two research directions of background medium theory for celestial body motion, concrete equation forms and their summary of the theoretic frame of celestial body motion are introduced. Future more, by discussing the general form of Binet's equation of celestial body motion orbit and it's solution of the advance of the perihelion of planets, some relations and differences between the continuous orbit theory and Newton's gravitational theory and Einstein's general relativity are given. And by discussing fractional-dimension expanded equation for the celestial body motion orbits, the concrete equations and the prophesy data of discrete orbit or stable orbits of celestial bodies which included the planets in the Solar System, satellites in the Uranian System, satellites in the Earth System and satellites obtaining the Moon obtaining from discrete orbit theory are given too. Especially, as preliminary exploration and inference to the gravitational curve of celestial bodies in broadly range, the concept for the ideal black hole with trend to infinite in mass density difficult to be formed by gravitation only is explored. By discussing the position hypothesis of fractional-dimension derivative about function and formula form the hypothesis of fractional-dimension derivative about power function, concrete equation formulas of fractional-dimension derivative, differential and integral are described distinctly further, and difference between the fractional-dimension derivative and the fractional-order derivative are given too. The difference equations description of the self-similar fractal extension and fractional-dimension extension are discussed. Subsequently, the concrete forms of measure tendency calculus equations of self-similar fractal obtaining by based on the definition of form in non-integral order calculus about general fractal measure are discussed again, and differences with Hausdorff measure method or the covering method at present are given. By applying the measure calculation equations, measure of self-similar fractals which include middle-third Cantor set, Koch curve, Sierpinski gasket and orthogonal cross star are calculated and analyzed. At the end, the calculating equations of dimension and measure of an ideal points set are explored.

Keywords orbit of celestial body motion, background medium theory, continuous orbit, discrete orbit, self-similar fractal measure, non-integral order calculus, fractional-order calculus, fractional-dimension calculus

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http://www.nature.ac.cn/papers/paper-pdf/celestialandmaths-pdf.pdf

关于对无穷予以虚数形式标记的初步注释

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摘 要：给出对无穷予以虚数形式标记的初步讨论注释。

关键词：无穷，0，虚数形式，标记，注释，Euler 公式

Primary annotation of symbol basing on imaginary form about infinity

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Abstract In this paper, primary annotation of symbol basing on imaginary form about infinity is given.

Keywords infinity, zero, imaginary form, symbol, annotation, Euler's formula

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60 年来大气中二氧化碳浓度数据的趋势方程研究

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摘 要：通过讨论已有的 60 年来大气中 CO_2 浓度数据的分布状态，采用趋势分析方法，给出了具体趋势方程形式。与冰芯分析或观测数据对比结果表明，趋势方程曲线与已有数据基本符合，随后初步给出了 2010 年至 2016 年间大气中 CO_2 浓度预测值，并简略探讨了地球公转、自转及全球板块运动三者之间关系的耦合模式。

关键词：二氧化碳浓度，大气，趋势方程，曲线拟合，预测值，数据分析，耦合模式

Research on tendency equation about the concentration data of carbon dioxide in the atmosphere over the past 60 years

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Abstract In this paper, by discussing the existing distribution of the CO_2 concentration data in the atmosphere over the past 60 years, and adopting the tendency analytical method, concrete tendency equation forms of the CO_2 concentration are presented at first. Further more, comparison result between the curve of the theoretical equation and the data curve of CO_2 concentration from the ice cores analysis or the observation is given. The result shows that the tendency equation curve agree well with the existing data. Subsequently, predictive data of the CO_2 concentration in the atmosphere during the year from 2010 to 2016 are suggested tentatively, and the coupling model of the relationship among the rotation, rotation and the global plate motion of the earth is briefly discussed.

Keywords concentration of carbon dioxide, atmosphere, tendency equation, curve fitting, predictive data, data analysis, coupling model

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数据曲线间断区域的自适应连接方程研究

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摘 要：通过讨论非线性动力学方程的近似等效解析解及数据曲线间断区域的性质，给出间断区域的自适应连接方程构造形式及其参数确定的预置迭代方法，进而亦给出一般曲线间断区域的映射方程组连接方法，随后给出计算实例，其中包括位错间断区域与回转间断区域的映射方程组及光滑连接曲线。此自适应连接方程，可以作为经典 S 型曲线方程或 Logistic 函数的一般扩展形式（扩展型双曲正切函数）予以应用；其中对于缓变数据曲线阶跃间断区域，可自动计算生成连接方程形式。文中分析了非线性方程在经典 Newton 动力学方程及 RLC 串联电路电荷方程方面的兼容性；基于自适应连接方程探讨分析了自然现象演化系列相变函数的一种扩展型双曲正切级数近似表示形式、磁性材料磁滞回线方程、粒子统计分布的平均能量方程扩展形式及平均粒子数趋势性微分方程、稳定核素比结合能趋势方程、核素结合能的理论最大值及其相应质子数、太阳系元素丰度的趋势方程、势能函数曲线趋势方程（诸如双原子分子势能函数曲线方程）、自然饱和过程方程（诸如钢材料断裂韧性方程）及金属或岩石蠕变过程方程。

关键词：非线性动力学方程，数据曲线间断区域，自适应连接方程，映射连接方程，磁滞回线方程，粒子统计分布方程，比结合能方程，太阳系元素丰度方程，势能函数曲线方程，自然饱和过程方程，蠕变过程方程

Research on adaptive connection equation in discontinuous area of data curve

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Abstract In this paper, by discussing approximate equivalent analytical solution of nonlinear dynamics equation and some properties in discontinuous area of data curve, a general constructing form of adaptive connection equation and preset iteration method determining parameters in discontinuous area are given. And then, a connecting method of the mapping equations for the discontinuous areas of general curves is also given. Subsequently, computing examples which included the discontinuous areas with dislocation and turn-back are given too. This adaptive connection equation can be applied as a general form of expansion (extended hyperbolic tangent function) of the classical S-curve (sigmoid curve) equation or Logistic function, and for step discontinuous area of slowly varying data curve, its form of the adaptive connection equation can be obtained by automatic calculating. In this paper, compatibility of the nonlinear equation in classical Newton dynamic equation and the charge equation of the RLC series circuit is analyzed. Basing on the form of the adaptive connection equation, an approximate expression of extended hyperbolic tangent series for the characteristic function of the series phases transition of the evolution of phenomena, equations of magnetic hysteresis loop for magnetic material, extended form of average energy equation (or Einstein-Stern equation) and tendency differential equation of the average particle number for the statistical distributions of the particles, equation of average binding energy per nucleon (or specific binding energy) of stable nuclide, a theoretical maximum of the nuclear binding energy and its corresponding proton number, abundances equation of elements in the Solar System, curvilinear equation of potential energy function (such as curvilinear equation of potential energy function of diatomic molecule, etc), equation of natural saturation process (such as tree growth and physical reaction or chemical reaction process, equation of fracture toughness for steel material, etc) and equation of typical creep process for metal or rock material are explored and analyzed tentatively.

Keywords nonlinear dynamics equation, discontinuous area of data curve, adaptive connection equation, connecting method of the mapping equations, equations of magnetic hysteresis loop, equation of statistical distributions of the particles, equation of average binding energy per nucleon, abundances equation of elements in Solar System, curvilinear equation of potential energy function, equation of natural saturation process, equation of creep process

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关 于 连 接 方 程 的 简 略 注 释

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摘 要：本文给出了连接方程的构造过程及其若干应用的简略注释，讨论了连接方程是一非线性动力学方程的近似等效解析解的分析方法，分析了一类简单非线性微分方程的基本解析解表示形式，探讨了自然现象演化过程的规律谱系（或谱阵）及连接纽带大略—简学或维学研究方向，提出了现象在演化过程的状态转变方程，其在一般情况下遵循最优或最简洁路径光滑曲线方程形式这一自然最优原则或自然简洁原则，给出了前偏对称(欠对称或弱对称)方程及后偏对称方程的简洁构造形式，构建了现象演化系列相变特征函数的一种扩展型双曲正切级数近似表示形式，继而提出了自然演化平衡法则，给出了生物生长曲线趋势性方程；依据连接方程的非线性动力学方程近似形式，预言了二个基于非线性动力学方程的电路元件－电存器(nonlinstor)和电敏器(geomsentor)，其皆为深化型电容器的电路器件，分析了 RLCNG 串联电路微分方程的性质；给出了广义分布函数及广义分布密度函数的延展方向与粒子统计分布趋势性方程及其若干条件解，讨论了 Planck 量子方程的频率区间性质，探讨了具有近似线性变频解的非线性微分方程形式及在负频率情况下变频波动方程的曲线形态特征，讨论了数据库理论构架（此构架由基础数据库、趋势性方程、解析数据库构成）的一种简洁模式，建立了美国年度能源消费量与 GDP 关系方程及英国年度人口数量与 GDP 关系方程，并计算预测了美国年度能源消费极限值与英国年度人口极限值；随后探讨了岩石及单晶高温材料的蠕变过程曲线、半导体分立器件 V－A 特性曲线、超导材料电阻 R（或电阻率 ρ）－绝对温度 T 曲线方程，双晶 Josephson 结直流特性曲线及 Shapiro 台阶电流阶跃幅值曲线的趋势拟合方程，机械系统或伺服系统摩擦力－速度特性曲线（包括 Coulomb 摩擦、Stribeck 摩擦、黏性摩擦、摩擦迟滞及反常摩擦迟滞效应）的趋势拟合方程，Newton 冷却定律的扩展方程形式，高聚物熔体流动曲线剪切应力－剪切速率（包括第一 Newton 区、假塑性区、第二 Newton 区、胀流区、湍流及反常剪切效应）的趋势性方程等。在唯象及趋势层面，指出了材料蠕变过程曲线与高聚物熔体流动曲线具有类似性质，及材料断裂裂纹扩展结构与流体湍流漩涡嵌套结构这二种现象演化在分形测度表述上具有相通性的研究方向；最后讨论了连接方程在数据拟合及长程预测方面的局限性。

关键词：连接方程，非线性动力学方程，规律谱阵，简学或维学，状态转化方程，自然简洁原则，自然演化平衡法则

Brief annotation of the connection equation

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Abstract In this paper, brief annotation of a constructing procedure and the applications of connection equation are given. An analytical method of the connection equation as an approximate equivalent analytical solution of nonlinear dynamics equations is discussed. The expressions of the basic analytical solution of a class of simple nonlinear differential equations are analyzed. Research direction of Jiansics or Dimennics about spectrum(spectrum array) formed by series of laws and their connections in evolution processes of natural phenomena are explored, an equation of the transformation of the phenomena between the states in evolutionary process is presented, that it follows a natural optimum principle or a natural conciseness principle in general, which having an equation form of the smooth curve with the optimal path or the most concise path, simple constructing forms of forward partial-symmetrical equation(or weak-symmetrical equation) and backward partial-symmetrical equation are given, an approximate expression of extended hyperbolic tangent series for the characteristic function of the series phases transition of the evolution of phenomena is constructed, then natural evolution-balance rule is presented, and tendency equation of biological growth process is given too. According to approximate form of the nonlinear dynamics equation of the connection equation, two new electronic circuit elements(nonlinstor and geomsentor) with deepening charge-controlled capacitor properties based on form of the nonlinear differential equation is predicted, and the nonlinear differential equation for a RLCNG series circuit is also analyzed, extended direction of the general distribution function and the general distribution density function, tendency equation and its conditional solutions of the statistical distributions of the particles are given, properties of the frequency interval of Planck's quantum equation are explored, nonlinear differential equation expressions with solution of approximate linear frequency conversion and their characteristics of curve shapes of frequency conversion wave equations at negative frequency are discussed, a concise model of database theoretical framework (this framework to be made up of foundation database, tendency equation, and analytic database) is explored, an equation of relationship between the total annual energy consumption with the annual GDP in the United States, and an equation of relationship between the annual population with the annual GDP in the United Kingdom are established, and limit values of the total annual energy consumption in the United States and the annual population in the United Kingdom are calculated and predicted. Subsequently, tendency fitting equations

of curves are explored, which included the creep process curve of the rock and the single-crystal superalloy, the Volt-Ampere characteristic curve of the discrete semiconductor device, the resistance (or resistivity)-absolute temperature curve of the superconducting material, the direct current *I-U* characteristic curve of the bicrystal Josephson junction, and the current step amplitude of Shapiro steps, the friction-speed characteristic curve (that included the stages of Coulomb friction, Stribeck friction, viscous friction, friction hysteresis, and anomalous friction hysteresis effect) in mechanical system or servo system, an expanded equation form of the Newton's law of cooling, the shear stress-shear rate in the flow curve (that included the sections of first Newtonian fluid-flow, pseudoplastic flow, second Newtonian fluid-flow, dilatant flow, turbulent flow, and anomalous shearing effect) of the polymer melts, etc. On phenomenological and tendency levels, research directions of similar property of creep curves of materials with the flow curves of polymer melt, and similarity in the fractal measure of the evolutions of fracture cracks growth structure and fluid turbulent eddies nested structure are pointed out. At the end, limitations of the connection equation in data fitting and long-range forecasting are discussed.

Keywords connection equation, nonlinear dynamics equation, spectrum array of laws, Jiansics or Dimennics, states transforming equation, natural conciseness principle, natural evolution-balance rule

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新型冠状病毒肺炎感染数据的 PSSIR 模型方程分析方法及其趋势预测

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摘 要：通过对 2003 年北京与香港二城市 SARS 病毒感染数据的分析讨论及基于在 2020 年 1 月 11 日～2 月 21 日之间中国境内新型冠状病毒肺炎确诊感染人数数据的公布资料，采用简洁的一般饱和过程分析方法，给出了相应的偏对称方程（欠对称或弱对称方程）形式，进而由偏对称方程讨论了小样本数据量时的 SIR 模型方程组，给出了 PSSIR 模型方程形式及其近似解，在趋势层面分析计算了中国境内及中国境内除湖北省外地区新型冠状病毒肺炎感染累计数据，给出了相应的拐点位置与趋势预测的阶段性极限值，分析结果为病毒感染疫情发展过程的多变量非线性动力学方程组描述提供参考。

关键词：新型冠状病毒肺炎，SARS 病毒，感染数据，偏对称方程，PSSIR 模型方程，近似解，趋势预测

Analysis method of PSSIR model equations and its tendency prediction for the infection data of the novel coronavirus pneumonia(NCP) in China

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Abstract In this paper, by discussing the cumulative number of people of confirmed SARS(severe acute respiratory syndrome) virus infection in Beijing and Hongkong in 2003, and basing on the data of the number of novel coronavirus pneumonia(called NCP or 2019-nCOV(2019-new coronavirus)) confirmed infection in China between 11 January and 21 February 2020, using the simple analysis method of the general saturation process, corresponding partial-symmetrical equations(or weak-symmetrical equations) are given. Then by using the partial-symmetrical equations, the SIR model equations with the small sample data volume are discussed, PSSIR model equations and its approximate solutions are given preliminarily, and the accumulated data of the novel coronavirus pneumonia infection in China and in China except for Hubei Province are analyzed and calculated tentatively. At the same time, corresponding inflection point position and stage limit value of tendency prediction are given too. The results of this paper provide a reference for the description of multivariable nonlinear dynamic equations in the development of viral infection.

Keywords novel coronavirus pneumonia, SARS virus, infection data, partial-symmetrical equations, PSSIR model equations, approximate solutions, tendency prediction

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