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The End of Teratogenic Simplified Dirac Hydrogen Equations

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The two-component radial wave function of the Dirac equation of hydrogen is decomposed by linear combination function, which leads to the difference in the range of energy eigenvalues of the new first-order differential equations and the corresponding two simplified second-order differential equations constrained by the same energy parameter, belonging to the teratogenic simplified Dirac equation. The teratogenic simplification theory of the Dirac equation of hydrogen atom introduces the term "decoupling", which is far from scientific logic, thus deleting a recursive relationship or corresponding second-order differential equation whose eigenvalue set does not meet the expectation, and only retaining the other one whose eigenvalue set value meets the expectation. Such an obvious logic problem has not been discovered or intentionally covered up, reflecting the real background of modern physics. Here, we first use the machine proof method to prove that the coefficient of the series solution of the teratogenic simplified first-order Dirac equation system should satisfy the linear recurrence relationship system without solution, which also proves that the teratogenic simplified first-order Dirac equation system has no eigensolution. Then the mathematical proof of the absence of solution of the teratogenicity simplified first-order Dirac equation system is given from different aspects. The simple truth is that the inconsistency of the eigenvalues of the two teratogenic simplified second-order differential equations destroys the existence and uniqueness theorem of the solutions of the differential equations. The essence of decoupling is to intentionally delete one of the two parallel second-order differential equations. The methods and conclusions do not conform to the unitary principle. It is concluded that the decoupled eigensolution of the teratogenic simplified first-order Dirac equation is pseudo-solution. The teratogenic simplified Dirac equation for the hydrogen-like atoms is therefore ended, and this conclusion is irreversible.

Keywords: Dirac equation; linear combination function transformation; teratogenic simplified equation; existence and uniqueness theorem of solution; unitary principle.

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1 Introduction

As the enlightenment equation of relativistic quantum mechanics[1-7], the Klein-Gordon equation of the Coulomb field has been ended because of the irreparable contradiction hidden in logic[8]. Is there any logic contradiction hidden in the Dirac equation or its evolution equation, which is the mainstream equation of relativistic quantum mechanics?

Dongfang unitary principle[9-11] is an effective logical standard for testing the self-consistency of various theoretical logic, which is widely applicable to reveal whether there are logical contradictions hidden in the theories of natural science and social science. The reliability of this principle lies in stating a simple fact: *there is a certain transformation relationship between different metrics, and the natural law itself does not change because of different metrics. If the mathematical form of natural law under different metrics is transformed to one metrics, the result must be the same as the inherent form under this metrics, 1=1, and the transformation is unitary.* The unitary principle has made many important breakthroughs. Its application to quantum mechanics has led to the discovery of the morbid equation of quantum numbers[10] and the discovery of the incompatibility of multiple operator evolution equations of the angular motion law[12], and led to the end of the Yukawa nuclear force meson theory and the end of Klein-Gordon equation for the Coulomb field[12].

As we all know, the relativistic Dirac equation is considered to be an accurate wave equation describing the motion of microscopic particles. Its great influence and the mystery of popular science description have led to various named Dirac equations, some of which are not

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Dirac equations in essence, and the conclusions and even methods are specious. In short, by comparing the solutions of various Dirac equations, it is easy to find whether the Dirac wave function and energy level formula of the Coulomb field satisfy the existence and uniqueness theorem. Various Dirac equation theories do not conform to the unitary principle, that is, they destroy the existence and uniqueness theorem for the solution of the same physical model, and more than one of them must contain significant logical defects.

New equations are obtained from the original Dirac matrix equation[1-5] through function transformation, some of which are reasonable, some are unreasonable and even deformed. The solution of the deformed Dirac equation is formal or pseudo-solution. However, in modern physics, when the formal solution of the equation that does not conform to the mathematical operation law is consistent with the expected solution, the real solution that conforms to the mathematical operation law but does not conform to the expectation is often removed by new definitions or interpretations. This development pattern prevented later physicists from finding wave equations that are more accurate. In fact, the establishment and solution of some equations in modern physics imply enough irreconcilable mathematical contradictions, even though the equations themselves may not be correct, but they are rendered as major scientific research achievements.

Here I will focus on the simplified equation of the distortion of the Dirac equation for the hydrogen atom. First, the non-existence of the solution of the teratogenic simplified first-order Dirac hydrogen equation is proved by using the method of machine solving the recursive relationship group and the method of mathematical logic proof. Then the non-existence of the solution of the teratogenic simplified second-order Dirac hydrogen equation and the deceptive nature of the so-called decoupling technique is analyzed. The problem originates from quantum mechanics, but its demonstration process is purely mathematical.

2 First order teratogenic simplified Dirac equation system

The treatment of a wave equation of quantum bound state system often focuses on obtaining the expected quantized energy formula. To solve the bound state Schrödinger equation or Klein-Gordon equation, the boundary condition requires that the power series solution must be interrupted to any polynomial, so the recurrence relationship[13] of the coefficients of the series needs to be interrupted to any general term, and the eigenvalue set and the quantized energy formula are naturally derived. Its strict mathematical basis is the differential equation optimization theorem[14, 15]. To solve the Dirac equation with at least two wave function components, the original equation is usually transformed into a set of differential equations with respect to the wave function components. According to the boundary conditions, two power series must also be interrupted into arbitrary polynomials. This means that the two recurrence relationship groups for determining the series coefficients must be interrupted to any general term, thus the Dirac wave function and Dirac energy level formula as the solution of the Dirac equation are obtained. According to the theorem of optimal differential equation, the existence and uniqueness of the solution of Schrödinger equation can be proved. However, some non-orthodox second-order Dirac equations and new first-order Dirac equations only focus on finding the Dirac formula of energy levels, and the given solutions actually violate the existence and uniqueness theorem of the solutions of Dirac equations. These second-order and first-order equations are substantially different from the original Dirac equation, which is called the teratogenic simplified Dirac equation.

It is generally believed that the Dirac equation succeeds in describing the fine structure of hydrogen and hydrogen-like atom[16-18]. From then on, multifarious first-order and second-order Dirac equations[19-27] were introduced more and more by much literature. It seems very ingenious to introduce linear combination function transformation to transform the original first-order Dirac equation system into a simplified first-order Dirac equation system and then into a simplified second-order differential equation. Its first-order and second-order equations are precisely the teratogenic simplified Dirac equation. A modern quantum mechanics book[28] introduces its “decoupling” solution in detail. This section discusses the nonexistence of the eigensolution of the quasilinear linear recurrence relationship system determined by the first-order teratogenic simplified Dirac equation system for the hydrogen.

The Dirac equation is a four-order matrix first-order differential equation system of four-component wave function. When applied to the hydrogen atom, after being transformed by special operation independent of mathematics, the last thing to be dealt with is the radial Dirac equation of two-component wave function in the following form,

$$\left[c\vec{\alpha}\cdot\hat{\mathbf{p}}+\begin{pmatrix}1&0\\0&-1\end{pmatrix}mc^2-\frac{Ze^2}{4\pi\varepsilon_0 r}\right]\begin{pmatrix}\psi_1\\\psi_2\end{pmatrix}=E\begin{pmatrix}\psi_1\\\psi_2\end{pmatrix}\tag{1}$$

where $\vec{\alpha}$ is the Dirac matrix, $\hat{\mathbf{p}}=-i\hbar\nabla$, $\hbar=h/2\pi$ with the plank constant h, c the velocity of light in a vacuum, and $m$the rest mass of electron. $\vec{\alpha}\cdot\tilde{\mathbf{p}}$ is defined by the Dirac algebra

$$\vec{\alpha}\cdot\tilde{\mathbf{p}}=\begin{pmatrix}0&-i\\i&0\end{pmatrix}\left[-i\hbar\frac{\partial}{\partial r}-\frac{i\hbar}{r}+\frac{i\hbar}{r}\begin{pmatrix}1&0\\0&-1\end{pmatrix}\hat{\kappa}\right]\tag{2}$$

Where the angular quantum number $\kappa=\pm1,\ \pm2,\ \pm3,\ \cdots$. The two-component wave function is usually expressed in the following form,

$$\begin{pmatrix}\psi_1\\ \psi_2\end{pmatrix}=\frac{1}{r}\begin{pmatrix}F(r)\\ G(r)\end{pmatrix} \tag{3}$$

The Coulomb interaction energy of a point nucleus and a particle of charge $-e$ is $V=-e^2/r$. Substituting (2) and (3) into (1) yields the first-order differential equation of the newly introduced component functions $F(r)$ and $G(r)$, which is called the first-order radial teratogenic simplified Dirac equation system,

$$\begin{aligned}&\frac{dG}{dr}+\frac{\kappa}{r}G-\left(\frac{E+m_0c^2}{\hbar c}+\frac{Z\alpha}{r}\right)F=0\\ &\frac{dF}{dr}-\frac{\kappa}{r}F+\left(\frac{E-m_0c^2}{\hbar c}+\frac{Z\alpha}{r}\right)G=0\end{aligned} \tag{4}$$

where $\alpha=e^2/\hbar c\approx 1/137$ is the fine-structure constant, m_0 is the rest mass of the electron, $c$the velocity of light in vacuum, $\hbar=h/2\pi$ and h is the Plank constant; E is the energy eigenvalue parameter. The expectant solution of this equation includes two terms: energy eigenvalue and eigenfunction. It should be noted that the symbols in this equation set listed in different textbooks are inconsistent, but this does not affect the demonstration process and conclusion of this paper.

Generations of researchers have worked hard to find different methods to solve the Dirac equation for the hydrogen atom, including introducing function transformation and constructing new first-order and second-order similar equations. There is a so-called "decoupling" solution. First, function transformation is introduced to transform the original Dirac equation into a first-order differential equation set about new variables, then into a second-order differential equation for solution, and then a second-order differential equation that does not meet expectations is removed. Various transformation equations with transformation functions[29] are similar or even identical in nature. The typical teratogenic simplified Dirac equation process of hydrogen like atom is as follows. Introducing linear combination function transformation

$$\begin{aligned}&\rho=\frac{2\sqrt{m_0^2c^4-E^2}}{\hbar c}r\\ &G(\rho)=\sqrt{m_0c^2+E}e^{-\frac{\rho}{2}}\left[\phi_1(\rho)+\phi_2(\rho)\right]\\ &F(\rho)=\sqrt{m_0c^2-E}e^{-\frac{\rho}{2}}\left[\phi_1(\rho)-\phi_2(\rho)\right]\end{aligned} \tag{5}$$

and substituting this into equation (4) reads the equations,

$$\begin{aligned}&\frac{d\phi_1}{d\rho}-\left(1-\frac{Z\alpha E}{\hbar c\lambda\rho}\right)\phi_1+\left(\frac{\kappa}{\rho}+\frac{Z\alpha m_0c^2}{\hbar c\lambda\rho}\right)\phi_2=0\\ &\frac{d\phi_2}{d\rho}-\frac{Z\alpha E}{\hbar c\lambda\rho}\phi_2+\left(\frac{\kappa}{\rho}-\frac{Z\alpha m_0c^2}{\hbar c\lambda\rho}\right)\phi_1=0\end{aligned} \tag{6}$$

where $\gamma=\sqrt{\kappa^2-Z^2\alpha^2}$, $\nu=0,1,2,\cdots,n$. This is the recursion relationship group that the coefficients of the two series should meet, which is called the teratogenic simplified recursion relationship group of the Dirac equation. The decoupling method only selects one of the recurrence relationships and deletes the other recurrence relationship that cannot determine the eigenvalues. In formal logic, Dirac formula (3) is obtained. So, does the recurrence relationship group (7) really have an eigensolution? In the following, the machine method and the mathematical deduction method are respectively used to prove that the eigensolution of the teratogenic simplified first-order differential equation system (6) of the recurrence relationship group (7) does not exist.

$$\phi_1=\rho^\gamma\sum_{\nu=0}^{\infty}\alpha_\nu\rho^\nu,\quad \phi_2=\rho^\gamma\sum_{\nu=0}^{\infty}\beta_\nu\rho^\nu$$

Inserting them into equation (6) and comparing the coefficients of similar terms yield two recurrence relations

$$\begin{aligned}&\left(\nu+\gamma+\frac{Z\alpha E}{\hbar c\lambda}\right)\alpha_\nu+\left(\kappa+\frac{Z\alpha m_0c^2}{\hbar c\lambda}\right)\beta_\nu=\alpha_{\nu-1}\\ &\left(\kappa-\frac{Z\alpha m_0c^2}{\hbar c\lambda}\right)\alpha_\nu+\left(\nu+\gamma-\frac{Z\alpha E}{\hbar c\lambda}\right)\beta_\nu=0\end{aligned} \tag{7}$$

where $\gamma=\sqrt{\kappa^2-Z^2\alpha^2}$, $\nu=0,1,2,\cdots,n$. This is a system of recurrence relations, which is called the teratogenic simplified Dirac system of recurrence relations. Solving this recurrence relation system is as cumbersome as solving the recurrence relations of two second-order differential equations. In the decoupling solution, the latter is selected and a second-order differential equation is selectively removed, and the eigenvalue (3) is obtained in formal logic. This actually implies that the linear recurrence relation group (7) has an eigensolution and the eigenvalue is also Dirac formula (3). So does recurrence relation group (7) really have an eigensolution? In the following, the eigenvalues of recurrence relations (7) and therefore the eigensolutions of the teratogenic simplified first-order differential equations (6) are proved by the machine method and mathematical deduction method respectively do not exist.

3 Machine proof of no solution for ground state and first excitation states

Wolfram Mathematica and other operational programs can well handle linear and quasilinear equations. The existence of eigensolutions of quasilinear equations (7) can be proved by Wolfram Mathematica program. The following are the steps and conclusions of Wolfram Mathematica to prove that the equation system (7) has no solution. Substitute letters $E\to\varepsilon$ for machine recognition, and substitute $E\to\varepsilon$ and $\lambda=\sqrt{m_0^2c^4-E^2}\big/\hbar c$ into the recurrence relationship group (7), so as to obtain the form expressed by four kinds of undetermined parameters $\alpha_{\nu-1}$, α_ν, β_ν and ε,

$$\begin{aligned}&\left(\nu+\sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_\nu+\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_\nu=\alpha_{\nu-1}\\&\left(\kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_\nu+\left(\nu+\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_\nu=0\end{aligned}\tag{8}$$

The recurrence relationship group (7) or (8) is derived from the teratogenic simplified Dirac equation (6), and is not equivalent to the linear recurrence relationship derived from the series solution of the original Dirac equation.

Now let's prove that the eigensolution of the corresponding ground state of the recurrence relationship group (8) does not exist. Using the method of proof to the contrary, if the eigensolution exists, then the ground state solution must exist, and the recurrence relationship group can be interrupted to $n=0$, that is, $\alpha_1=\alpha_2=\cdots=0,\beta_1=\beta_2=\cdots=0$. Noting that $\alpha_{-1}=\alpha_{-2}=\cdots=0$, $\beta_{-1}=\beta_{-2}=\cdots=0$, when shilling $\nu=0$ is substituted into the equation system (8), the ground state solution requires $\alpha_0\neq0$ and $\beta_0\neq0$, and two homogeneous equations are obtained,

$$\begin{aligned}&\left(\sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_0+\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_0=0\\&\left(\kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_0+\left(\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_0=0\end{aligned}$$

Then let $\nu=1$ be substituted into the first equation of equation (8). The ground state solution requires $\alpha_1=0$ and $\beta_1=0$, and then another particular equation is obtained

$$\alpha_0=0$$

This particular equation is easily ignored. The above three equations give a set of contradictory equations. We should have easily judged whether the solution of this equation does not exist. However, various deformations hide this conclusion and are given solutions that meet expectations, indicating that their expected solutions are unreasonable and have been strongly attacked. Such issues should have a standardized and systematic scientific procedure to reduce unnecessary disputes. This is the reason for recommending machine certification. The format for solving this equation set with Mathematica is

$$\begin{aligned}&\mathrm{Solve}[\{\left(\sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_0+\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_0==0,\\&\left(\kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_0+\left(\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_0==0,\\&\alpha_0=0\},\{\alpha_0,\beta_0,\varepsilon\}]\end{aligned}\tag{9}$$

Run the calculation after outputting the above format statement in Mathematica, and the output result is: $\{\{\alpha_0->0,\beta_0->0\}\}$. If the first term of the first two equations is simplified from the last equation, a formal energy eigenvalue can be obtained, which is equivalent to the formal solution of the second equation, but it does not meet the first equation. The results show that the eigenvalues of the ground-state energy ε, i.e. E, do not exist, while the recurrence relationship group (8) has only trivial solutions, so the teratogenic simplified Dirac equation group (6) has only trivial solutions. In modern physics, once meaningless equations have been written with some mathematical skills to meet the expectations of some form of solution, physics readers usually focus on the success of prediction, and rarely test whether the relevant mathematical process is logical. This illogical mathematical technique has been widely cited and popularized, which has created strong pressure for more researchers to follow so as to achieve the expected goal efficiently. The progress and development of physical theory in this mode is very difficult.

In the same way, it can also be proved that the first order transformation Dirac differential equations (6) has no first excited state solution. Let the recurrence relationship group (8) break to $n=1$, that is, $\alpha_2=\alpha_3=\cdots=0$, $\beta_2=\beta_3=\cdots=0$, and in principle, the wave function of the first excited state requires $\alpha_1\neq0$, $\beta_1\neq0$. Noting that $\alpha_{-1}=\alpha_{-2}=\cdots=0$, $\beta_{-1}=\beta_{-2}=\cdots=0$, substitute shilling $\nu=0$ into the equation system (8), and use $\alpha_{-1}=0$ to obtain

$$\left(\sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_0+\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_0=0$$
$$\left(\kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_0+\left(\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_0=0$$

Then substitute $\nu=1$ into equation system (8) to get

$$\left(1+\sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_1+\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_1=\alpha_0$$
$$\left(\kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_1+\left(1+\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_1=0$$

Then substitute $\nu=2$ into equation system (8), and use $\alpha_2=\beta_2=0$ to obtain another particular equation

$$\alpha_1=0$$

This special equation is destructive. The above five equations give the equations to determine the ground state solution, which determines that the first excited state solution does not exist. Using the machine proof method, the Mathematica solution format of this equation system is

$$\begin{aligned}
&\mathrm{Solve}[\{\left(\sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_0+\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_0==0,\\
&\left(\kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_0+\left(\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_0==0,\\
&\left(1+\sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_1+\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_1==\alpha_0,\\
&\left(\kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_1+\left(1+\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_1==0,\\
&\alpha_1=0\},\{\alpha_0,\beta_0,\alpha_1,\beta_1,\varepsilon\}]
\end{aligned}\tag{10}$$

Running the calculation after outputting the above format statement in Mathematica, and there is no output result for a long time. The reason may be that the energy parameter is not solvable. Remove the energy parameter from the required solving parameters and modify the format of solving equations to

$$\begin{aligned}
&\mathrm{Solve}[\{\left(\sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_0+\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_0==0,\\
&\left(\kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_0+\left(\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_0==0,\\
&\left(1+\sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_1+\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_1==\alpha_0,\\
&\left(\kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\alpha_1+\left(1+\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha\varepsilon}{\sqrt{m_0^2c^4-\varepsilon^2}}\right)\beta_1==0,\\
&\alpha_1=0\},\{\alpha_0,\beta_0,\alpha_1,\beta_1\}]
\end{aligned}\tag{11}$$

The calculation output is: $\{\{\alpha_0->0,\ \beta_0->0,\ \alpha_1->0,\ \beta_1->0\}\}$. This indicates that the parameter representing energy cannot be solved, or even if the root of the energy parameter is obtained, it is a formal solution and does not conform to the physical meaning. The wave function does not exist, and the energy parameters can be assigned randomly. The process of processing the equation is different, and the formal solution obtained may be different, but the formal solution has no arbitrary meaning. Therefore, the energy eigenvalue of the solution of the first excited state does not exist, while the equation system has only trivial solutions, and the recurrence relationship system (8) thus the differential equation system (6) has no nontrivial solutions.

4 Logical contradictions of unreal solutions of ground state and arbitrary energy state

The above machine proves that the teratogenic simplified second-order Dirac equation system (6) has no ground state solution and the first excited state solution. It also clearly shows that the teratogenic simplified second-order Dirac equation has no other eigensolutions. The formal solutions given in relevant literature are pseudosolutions. The differential equation without solution is given pseudo-solution, and its operation process must hide the logical contradiction that violates the unitary principle and form a mathematical paradox. We have always recommended the unitary principle to researchers. The unitary principle is the most effective logical principle to test the wrong old theory and establish the correct new theory.

Now let's discuss the reason why there is no solution to the recurrence relation system satisfied by the coefficients of the formal series solution of the first order Dirac equation. First, the mathematical contradiction implied in the eigenvalues of the teratogenic simplified Dirac recurrence relation group (7) in the ground state case will be revealed. It is assumed that the formal ground state solution of the teratogenic simplified Dirac equation (6) takes the form $\varphi_{01} = \alpha_0 \rho^{\sqrt{\kappa^2 - Z^2\alpha^2}}$ and $\varphi_{02} = \beta_0 \rho^{\sqrt{\kappa^2 - Z^2\alpha^2}}$, substituting it into the system of equations (6) yields the following system of algebraic equations that the undetermined parameters α_0, β_0 and E_0 satisfy

$$
\begin{aligned}
&\left(\sqrt{\kappa^2 - Z^2\alpha^2} + \frac{Z\alpha E_0}{\sqrt{m_0^2c^4 - E_0^2}}\right)\alpha_0 + \left(\kappa + \frac{Z\alpha m_0 c^2}{\sqrt{m_0^2c^4 - E_0^2}}\right)\beta_0 = 0 \\
&\left(\kappa - \frac{Z\alpha m_0 c^2}{\sqrt{m_0^2c^4 - E_0^2}}\right)\alpha_0 + \left(\sqrt{\kappa^2 - Z^2\alpha^2} - \frac{Z\alpha E_0}{\sqrt{m_0^2c^4 - E_0^2}}\right)\beta_0 = 0 \\
&\alpha_0 = 0
\end{aligned}
\tag{12}
$$

Admittedly, this system of recurrence relations can also be obtained by making $\nu = 0$ and $\nu = 1$ in the recurrence relation group (8), where $\alpha_{-1} = 0$. Clearly, the third formula $\alpha_0 = 0$ is just a negation to all unreal solutions, because $\alpha_0 = 0$ must read $\beta_0 = 0$, indicating that the ground state of the teratogenic simplified Dirac equation does not exist. However, relevant literature avoids the result of $\alpha_0 = 0$ caused by $\beta_0 = 0$ and transfers to the general case of discussing any energy state, thus forming a formal mathematical logic. For the ground state case, the reasoning carried out by this formal mathematical logic is equivalent to substituting the third formula of (12) into the first and second formulas, because it is easy to create a false image to obtain the formal non-trivial solution, and there should be $\beta_0 \neq 0$ and then

$$
\begin{aligned}
&\alpha_0 = 0,\ \beta_0 \neq 0 \\
&\left(\kappa + \frac{Z\alpha m_0 c^2}{\sqrt{m_0^2c^4 - E_0^2}}\right)\beta_0 = 0 \\
&\left(\sqrt{\kappa^2 - Z^2\alpha^2} - \frac{Z\alpha E_0}{\sqrt{m_0^2c^4 - E_0^2}}\right)\beta_0 = 0
\end{aligned}
\tag{13}
$$

Dirac theory has defined $\kappa = \pm 1,\ \pm 2,\ \pm 3,\ \cdots$ through special mathematical steps. This system of equations has two incompatible solutions. From the second equation and the third equation,

$$
\begin{aligned}
\sqrt{m_0^2c^4 - E_0^2} &= -\frac{Z\alpha m_0 c^2}{\kappa} \\
\sqrt{m_0^2c^4 - E_0^2} &= \frac{Z\alpha E_0}{\sqrt{\kappa^2 - Z^2\alpha^2}}
\end{aligned}
\tag{14}
$$

Obviously, the two different results do not conform to the unitary principle. In addition, the first result itself destroys the unitary principle because the different definition domains of positive and negative values of Dirac angular quantum numbers also lead to contradictory value domains. The conclusion that destroys the unitary principle constitutes a mathematical paradox of $1 \neq 1$. If we mechanically eliminate the root sign on the left of the equation without thinking, further calculation will lead to more contradictions. However, under the decoupling operation of the teratogenic simplified Dirac equation theory, the first solution corresponding to the imaginary number energy that is not tenable is deleted, and only the second formal solution of (14) is taken, giving the same energy eigenvalue as the Dirac formula, which has been widely recognized by the academic community and has been continuously developed. Middle school students all know that this solution is completely wrong. Why was it considered a deliberate attack on outstanding research achievements to criticize such serious and low-level mathematical mistakes in the early years and submit them to famous academic journals? Defining the term "decoupling" to take the second of the two results in (14) and convert it into the Dirac energy level formula seems to be a small but fatal mathematical error! In fact, the first two equations of equation system (12) form a formal linear homogeneous equation system, which satisfies the necessary and sufficient conditions for the existence of nontrivial solutions,

$$\begin{vmatrix} \sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha E_0}{\sqrt{m_0^2c^4-E_0^2}} & \kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-E_0^2}} \\ \kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-E_0^2}} & \sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha E_0}{\sqrt{m_0^2c^4-E_0^2}} \end{vmatrix}=0 \tag{15}$$

Only the non-trivial solutions of α_0 and β_0 given by the first two equations in (12) are denied by the last equation in (12). This contradiction is summed up in the following concise form $\{\alpha_0 \neq 0,\ \beta_0 \neq 0\} \cap \{\alpha_0 = 0\}$. This is why the machine calculation (9) cannot solve the unknown number z that expresses the energy eigenvalue parameter E_0. One often pays attention to that if the formula of energy agrees with the Dirac formula, but not attaches importance to that if the logic is correct. In fact, $\alpha_0 = 0$ in the equations (12) implies that the factor of the wave function (5) for the ground state is inadvertently written as the form

$$\begin{aligned} G_0(\rho) &= \sqrt{m_0c^2+E}e^{-\rho/2}\phi_{02}(\rho) \\ F_0(\rho) &= -\sqrt{m_0c^2-E}e^{-\rho/2}\phi_{02}(\rho) \end{aligned} \tag{16}$$

As we all know, the Dirac equation for the hydrogen atom has no such solution. In other words, Dirac wave function cannot be decomposed in this way.

Quantum mechanics accurately solves the wave equation satisfied by the bound state quantum system to obtain the energy eigenvalues. However, the so-called decoupling method is essentially just to avoid the two contradictory formal solutions and choose the one that meets the expectation. Decoupling and removing any equation in the second order teratogenic simplified Dirac equation set is not in line with scientific logic. Why can all the literature consistently retain the equation that meets the expectation? In short, there are enough mathematical paradoxes hidden in the logic of the pseudoeigensolution (14) of the ground state of the variable Dirac equation, which has been covered up by the mathematical deformation process and must be explicitly denied now.

If a theory hides the basic contradiction such as $1 = -1$ or $1 \neq 1$, it must be wrong from beginning to end. Now let's prove that there is no arbitrary energy state solution for the first-order transformation Dirac equations. An incorrect theory often gives some specious deduction that cannot be distinguished from the correct theory, its mathematical errors are often ignored by readers. For the system of recurrence relations (7), one often pays attention to the general case to find the eigen-solution to the system of differential equations (6) for the n-excited state,

$$\begin{aligned} \phi_1 &= \alpha_0\rho^\gamma+\alpha_1\rho^{\gamma+1}+\cdots+\alpha_{n-1}\rho^{\gamma+n-1}+\alpha_n\rho^{\gamma+n} \\ \phi_2 &= \beta_0\rho^\gamma+\beta_1\rho^{\gamma+1}+\cdots+\beta_{n-1}\rho^{\gamma+n-1}+\beta_n\rho^{\gamma+n} \end{aligned} \tag{17}$$

Formally, inserting (17) into (6) and using $\gamma = \sqrt{\kappa^2-Z^2\alpha^2}$ as well as $\lambda = \sqrt{m_0^2c^4-E^2}\Big/\hbar c$, one obtains the system of linear algebraic equation for five undetermined parameters α_0, β_0, α_1, β_1 and E_1, it is

$$\begin{aligned}
&\left(\sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha E_2}{\sqrt{m_0^2c^4-E_n^2}}\right)\alpha_0+\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-E_n^2}}\right)\beta_0=0 \\
&\left(\kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-E_n^2}}\right)\alpha_0+\left(\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha E_2}{\sqrt{m_0^2c^4-E_n^2}}\right)\beta_0=0 \\
&\left(1+\sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha E_2}{\sqrt{m_0^2c^4-E_n^2}}\right)\alpha_1+\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-E_n^2}}\right)\beta_1=\alpha_0 \\
&\left(\kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-E_n^2}}\right)\alpha_1+\left(1+\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha E_2}{\sqrt{m_0^2c^4-E_n^2}}\right)\beta_1=0 \\
&\vdots \\
&\left(n+\sqrt{\kappa^2-Z^2\alpha^2}+\frac{Z\alpha E_2}{\sqrt{m_0^2c^4-E_n^2}}\right)\alpha_n+\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-E_n^2}}\right)\beta_n=\alpha_{n-1} \\
&\left(\kappa-\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-E_n^2}}\right)\alpha_n+\left(n+\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha E_2}{\sqrt{m_0^2c^4-E_n^2}}\right)\beta_n=0 \\
&\alpha_n=0
\end{aligned} \tag{18}$$

Of course, this system of equations can also be obtained directly from the system of linear recurrence relations (7). The first and second equations requires that the determinant of the coefficient equal zero, this has no problem. However, combining the last three formulas of (17) gives

$$\begin{aligned} &\left(\kappa+\frac{Z\alpha m_0c^2}{\sqrt{m_0^2c^4-E_n^2}}\right)\beta_n=\alpha_{n-1} \\ &\left(n+\sqrt{\kappa^2-Z^2\alpha^2}-\frac{Z\alpha E_2}{\sqrt{m_0^2c^4-E_n^2}}\right)\beta_n=0 \end{aligned} \tag{19}$$

in order to obtain the formal non-trivial solution, let $\beta_1\neq 0$, it must order that the coefficients before β_n equals zero, $n+\sqrt{\kappa^2-Z^2\alpha^2}-Z\alpha E_2\Big/\sqrt{m_0^2c^4-E^2}=0$, producing the eigenvalues of the energy levels for the n-excited state

$$E_n=\frac{m_0c^2}{\sqrt{1+\frac{Z^2\alpha^2}{\left(n+\sqrt{\kappa^2-Z^2\alpha^2}\right)^2}}} \tag{20}$$

It very coincidentally gives the Dirac energy level formula. However, this result does not make the equation group (18) tenable. The inverse recurrence operation will give the conclusion that either$\beta_0=0$ and $\alpha_{-i}\neq 0\ (i=1,2,3,\cdots)$ contradicting with the formula (17) or $\beta_0=0$ and $\alpha_{-1}=0$ becoming the ground state negative solution (13). Therefore, there is no arbitrary energy state solution for the first-order teratogenic simplified Dirac equations. Relativistic quantum mechanics usually only pays attention to fitting the expected energy level formula, but does not pay attention to whether the solution of the equation can meet the equation itself, which is an urgent problem to be solved.

5 General proof of no solution for teratogenic simplified Dirac recurrence relations

Here let's discuss the general solution of the corresponding recurrence relation group (7), so as to prove the nonexistence of the real solution of the first-order teratogenic simplified Dirac equation. The process of finding the solution of the coupled recurrence relationship is usually complex, but for two series (17) as the formal solution, the formal recurrence relationship group corresponding to the series coefficient can be transformed into two uncoupled recurrence relationships, and the eigenvalue solution method is very simple. Directly eliminating the coefficient β_ν in the equation (7) gives the uncoupled recurrence relationship of the coefficient α_ν in the power series ϕ_1,

$$\alpha_\nu=\frac{\nu+\gamma-\frac{Z\alpha E}{\hbar c\lambda}}{\left(\nu+\gamma\right)^2-\kappa^2+Z^2\alpha^2}\alpha_{\nu-1} \tag{21}$$

Then eliminating the coefficient α_ν in the equation (7) gives another uncoupled recurrence relations for the coefficient β_ν in the power series ϕ_2. The second equation in (7) can be written in the following form

$$\alpha_\nu=-\frac{\hbar c\left(\nu+\gamma\right)\lambda-Z\alpha E}{\hbar c\kappa\lambda-Z\alpha m_0c^2}\beta_\nu \tag{22}$$

consequently

$$\alpha_{\nu-1}=-\frac{\hbar c\left(\nu-1+\gamma\right)\lambda-Z\alpha E}{\hbar c\kappa\lambda-Z\alpha m_0c^2}\beta_{\nu-1} \tag{23}$$

substituting (22) and (23) into the first equation (7) reads

$$\beta_\nu=\frac{\nu-1+\gamma-\frac{Z\alpha E}{\hbar c\lambda}}{\left(\nu+\gamma\right)^2-\kappa^2+Z^2\alpha^2}\beta_{\nu-1} \tag{24}$$

Consequently, the system of recurrence relations (7) is equivalent to two uncoupled recurrence relations of first order(21) and (24). Because having the same energy eigenvalue parameters, they compose a system of equations

$$\begin{aligned} \alpha_\nu&=\frac{\nu+\gamma-\frac{Z\alpha E}{\hbar c\lambda}}{\left(\nu+\gamma\right)^2-\kappa^2+Z^2\alpha^2}\alpha_{\nu-1} \\ \beta_\nu&=\frac{\nu-1+\gamma-\frac{Z\alpha E}{\hbar c\lambda}}{\left(\nu+\gamma\right)^2-\kappa^2+Z^2\alpha^2}\beta_{\nu-1} \end{aligned} \tag{25}$$

On the surface, these two recurrence relations are independent of each other. But in fact, they contain the same parameter E representing energy, so they are inseparable. However, in their respective equations, the eigenvalues must meet the recurrence law of each self. It is supposed that the linear recurrence relations terminate at the term of $\nu=n$, namely, $\alpha_n\neq 0$, $\beta_n\neq 0$ and $\alpha_{n+1}=\alpha_{n+2}=\cdots=0$, $\beta_{n+1}=\beta_{n+2}=\cdots=0$. Substituting for equations (25) and using the sign $\lambda=\sqrt{m_0^2c^4-E^2}\Big/\hbar c$, we obtain

$$\begin{aligned} E_n&=\frac{m_0c^2}{\sqrt{1+\frac{Z^2\alpha^2}{\left(n+1+\sqrt{\kappa^2-Z^2\alpha^2}\right)^2}}} \\ E_n&=\frac{m_0c^2}{\sqrt{1+\frac{Z^2\alpha^2}{\left(n+\sqrt{\kappa^2-Z^2\alpha^2}\right)^2}}} \end{aligned} \tag{26}$$

where $\kappa=\pm1,\pm2,\cdots$ and $n=0,1,2,\cdots$, two formula are similar, nevertheless are actually different. When looking from a mathematical point of view, two formula have two different eigenvalues sets, the one and only eiegenvalues parameter of the same wave equation must satisfy two different eigenvalues sets, it can but choose their intersection. However, when looking from a physical point of view, the intersection delete energy of ground state, falling short of the natural law. In fact, the energy eigenvalues of the ground state given by the first formula is just the energy eigenvalues of the first excited state given by the second formula, this is very inexplicable.

For the same quantum system satisfying the Dirac wave equation, different solution method produce two different energy eigenvalues sets, the formulas (26) ever arose the profound misconception. There are some antagonistic points of view considering that making substitution $n+1 \to n$ for the first formula it is just the second formula. However, as $n=0$, this substitution implies $0+1 \to 0$. As the subscript of the coefficient of series, the natural number n cannot be allowed to make such substantiation. The different two results of the equations (26) denotative the solutions of the same energy eigenvalue parameter, it should order

$$\frac{m_0c^2}{\sqrt{1+\frac{Z^2\alpha^2}{\left(n+1+\sqrt{\kappa^2-Z^2\alpha^2}\right)^2}}} \overset{?}{=} \frac{m_0c^2}{\sqrt{1+\frac{Z^2\alpha^2}{\left(n+\sqrt{\kappa^2-Z^2\alpha^2}\right)^2}}} \tag{27}$$

implying $1=0$, which destroys the existence and uniqueness theorem of the solution and does not accord with the unitary principle. Therefore, it is not reasonable and effective to choose any of formal solutions that are contradictory. Teratogenic Simplified Dirac equation has no solution. There are too many interpretations, false qualitative descriptions and even pure sophistry in modern physics, which can be exposed and refuted by the unitary principle, and it is the best choice to give a conclusion through mathematical calculation.

The theoretical creators and promoters of the teratogenic simplified Dirac equation based on the teratogenic simplified Dirac wave function derive two contradictory second-order differential equations of hydrogen, and then use the term "decoupling" to understate and dilute the reader's attention. Remove one equation whose formal solution does not meet the expected solution and retain another differential equation whose formal solution meets the expected solution, and obtain the Dirac energy level formula, which is only a false solution, the obtained wave functions and energy eigenvalues do not actually satisfy the teratogenic simplified Dirac equation. The mathematical logic proof of the existence of the solution of the equation is strict. Machine proof only gives us enlightenment to find the reason for the result of machine proof. The machine proved that the teratogenic simplified Dirac equation has only trivial solutions. However, if the equation system is simplified first, the machine processing of the simplified equation system may also output the formal solution that only satisfies one equation in the equation system and does not satisfy other equations, which will give us the illusion that the formal solution is the real solution. This is the reason why the logic proof is further given when the Dirac equation of transformation has been proved to be no solution by machine. It must be pointed out that the exact solution of the original second-order Dirac equation with the exact boundary conditions[30, 31] is the more important issues to be discussed.

6 Deception of Decoupling second order teratogenic simplified Dirac Equation

In modern physics, there is a widespread phenomenon of seriously distorting mathematics and creating pseudo-scientific achievements. Now, the decoupling technique of the distorted simplified second-order Dirac equation is taken as an example to illustrate the deceptive nature of the physical theory that distorts mathematics. Teratogenic simplified second-order Dirac equation is derived from teratogenic simplified first-order Dirac equation set (6). Write the replacement forms of the two functions according to the equation set (6),

$$\begin{aligned}
\phi_1 &= \frac{1}{\left(\kappa-\frac{Z\alpha m_0c^2}{\hbar c\lambda}\right)}\left(-\rho\frac{d\phi_2}{d\rho}+\frac{Z\alpha E}{\hbar c\lambda}\phi_2\right)\\
\phi_2 &= \frac{1}{\left(\kappa+\frac{Z\alpha m_0c^2}{\hbar c\lambda}\right)}\left(-\rho\frac{d\phi_1}{d\rho}+\left(\rho-\frac{Z\alpha E}{\hbar c\lambda}\right)\phi_1\right)
\end{aligned} \tag{28}$$

Differential each expression once and get

$$\begin{aligned}
\frac{d\phi_1}{d\rho} &= \frac{-\rho\frac{d^2\phi_2}{d\rho^2}+\left(\frac{Z\alpha E}{\hbar c\lambda}-1\right)\frac{d\phi_2}{d\rho}}{\left(\kappa-\frac{Z\alpha m_0c^2}{\hbar c\lambda}\right)}\\
\frac{d\phi_2}{d\rho} &= \frac{-\rho\frac{d^2\phi_1}{d\rho^2}+\left(\rho-\frac{Z\alpha E}{\hbar c\lambda}-1\right)\frac{d\phi_1}{d\rho}+\phi_1}{\left(\kappa+\frac{Z\alpha m_0c^2}{\hbar c\lambda}\right)}
\end{aligned} \tag{29}$$

Substitute (28) and (29) into the teratogenic simplified first-order Dirac equations (6) to yield two teratogenic simplified second-order Dirac equations,

$$\begin{aligned}
&\rho^2\frac{d^2\phi_1}{d\rho^2}-\left(\rho^2-\rho\right)\frac{d\phi_1}{d\rho}\\
&-\left\{\left[\kappa^2+\frac{Z^2\alpha^2}{\hbar^2\lambda^2}\left(\frac{E^2}{c^2}-m_0^2c^2\right)\right]+\left(1-\frac{Z\alpha E}{\hbar c\lambda}\right)\rho\right\}\phi_1=0\\
&\rho^2\frac{d^2\phi_2}{d\rho^2}-\left(\rho^2-\rho\right)\frac{d\phi_2}{d\rho}\\
&-\left\{\left[\kappa^2+\frac{Z^2\alpha^2}{\hbar^2\lambda^2}\left(\frac{E^2}{c^2}-m_0^2c^2\right)\right]-\frac{Z\alpha E}{\hbar c\lambda}\rho\right\}\phi_2=0
\end{aligned} \tag{30}$$

According to the boundary conditions, the wave function is bounded, and the series solution of the two deformed simplified second-order equations must be interrupted to a polynomial of any term. However, the two Dirac equations are constrained by the same energy parameter E, and they are actually a system of second-order differential equations. And the solutions of the two equations must also satisfy the first-order equations (6) and the original first-order Dirac equations (4). Therefore, the highest power terms of the interrupted series solutions of the two equations are the same, respectively set as

$$\varphi_1=\sum_{\nu=0}^{n}b_\nu\rho^{s+\nu},\quad \varphi_2=\sum_{\nu=0}^{n}d_\nu\rho^{s+\nu}$$

Substitute them into the two equations of (30) to get

$$\sum_{\nu=0}^{n}\left\{\left[(s+\nu)^2-\kappa^2-\frac{Z^2\alpha^2}{\hbar^2\lambda^2}\left(\frac{E^2}{c^2}-m_0^2c^2\right)\right]b_\nu-\left(s+\nu-\frac{Z\alpha E}{\hbar c\lambda}\right)b_{\nu-1}\right\}\rho^{s+\nu}=0$$
$$\sum_{\nu=0}^{n}\left\{\left[(s+\nu)^2-\kappa^2-\frac{Z^2\alpha^2}{\hbar^2\lambda^2}\left(\frac{E^2}{c^2}-m_0^2c^2\right)\right]d_\nu-\left(s+\nu-1-\frac{Z\alpha E}{\hbar c\lambda}\right)d_{\nu-1}\right\}\rho^{s+\nu}=0$$

Then one gets a recursive relationship group composed of two recursive relationships that appear to be independent of each other but are actually constrained by the same energy parameter,

$$\begin{aligned}&\left[(s+\nu)^2-\kappa^2-\frac{Z^2\alpha^2}{\hbar^2\lambda^2}\left(\frac{E^2}{c^2}-m_0^2c^2\right)\right]b_\nu-\left(s+\nu-\frac{Z\alpha E}{\hbar c\lambda}\right)b_{\nu-1}=0\\&\left[(s+\nu)^2-\kappa^2-\frac{Z^2\alpha^2}{\hbar^2\lambda^2}\left(\frac{E^2}{c^2}-m_0^2c^2\right)\right]d_\nu-\left(s+\nu-1-\frac{Z\alpha E}{\hbar c\lambda}\right)d_{\nu-1}=0\end{aligned}\tag{31}$$

In the recursive relationship group (31), let $\nu=0$, and note that $b_{-1}=d_{-1}=0$, while $b_0\neq 0$ and $d_0\neq 0$, so the two equations have the same index equation, $s^2-\left(\kappa^2+\frac{Z^2\alpha^2E^2}{\hbar^2c^2\lambda^2}-\frac{Z^2\alpha^2m_0^2c^2}{\hbar^2\lambda^2}\right)=0$. Take the positive root that conforms to the bounded boundary condition of the wave function from the two roots,

$$s=\sqrt{\kappa^2+\frac{Z^2\alpha^2E^2}{\hbar^2c^2\lambda^2}-\frac{Z^2\alpha^2m_0^2c^2}{\hbar^2\lambda^2}}\tag{32}$$

Then, in the recursion relation group (31), let $v=n+1$, and notice that $b_{n+1}=d_{n+1}=0$, while $b_n\neq 0$ and $d_n\neq 0$, so two inconsistent eigenvalue equations are obtained,

$$\begin{aligned}&\left(s+n+1-\frac{Z\alpha E}{\hbar c\lambda}\right)b_n=0\\&\left(s+n-\frac{Z\alpha E}{\hbar c\lambda}\right)d_n=0\end{aligned}\tag{33}$$

where $\lambda=\sqrt{m_0^2c^4-E^2}\Big/\hbar c$. Middle school students are good at dealing with such equations. No matter what value E takes, it is impossible to satisfy two of these equations at the same time, which means that the wave function thus obtained cannot satisfy the first-order equations (6) and the original Dirac equations (4). A large number of related mathematical calculations are invalid. However, the theoretical creator of the teratogenic simplified Dirac equation defined a term "decoupling", deleted the first equation of (30) and retained the second equation, thus logically listing only the second recursive relationship of (31), and then taking only the second eigenequation of (33), it seems that the Dirac energy level formula of hydrogen can be reasonably obtained. This pseudo-science operation is very deceptive. If the "decoupling" technique can be incorporated into mathematics, then all the equations will be changed into one equation. Physicists who deny or even slander the above reasoning and conclusions should ask middle school students how to read so as not to make the lowest level of mathematical mistakes and should not indulge in their dazzling degrees and various titles all day long.

Famous journals only publish gossip articles with unclear logic, calculation errors and fabricated observation data, but they always refuse to make breakthroughs in correct discovery. Can editors of famous scientific journals such as Nature set an example, resign collectively, and hand over the disposal of those journals with the high reputation to the Great Mouse team, so as to save sacred science and rebuild academic ethics?

7 Conclusions and comments

Did one[32-36] ever note that the Dirac hydrogen wave function was practically unable to be separated into the form (5) and its similar forms? According to the unitary principle, no matter what transformation is introduced to transform the Dirac equation into the teratogenic simplified Dirac equation satisfied by the new function, if the determined new function is replaced back into the introduced transformation, the result must be the same as the original solution of the Dirac equation. The expected solution of the original Dirac equation cannot be decomposed into the form of (5), so it is incorrect to introduce function transformation (5). The formal solution of the transformation equation obtained has neither mathematical nor physical significance. Therefore, we do not need to carry out so many calculations and use the unitary principle to directly draw the conclusion that the teratogenic simplified solution is a pseudo-solution of Dirac's hydrogen equation. From this, we can also appreciate the great role of the unitary principle.

The nonexistence of the real solution of the teratogenic simplified Dirac equation should be a very simple mathematical problem and the similar problems implicit in theoretical physics are far more than the formal solution of the teratogenic simplified Dirac equation. The abnormal treatment of the Dirac equation is a typical example that the solution of modern physical equation violates the rules of a mathematical operation. The inference of the formal theory of ultra-small micro motion law and ultra large macro motion law described by modern physics is often similar to the inference of the stifled correct theory, and the distinction between the two is limited in experimental observation, because the two types of inferences have the same order of magnitude of accuracy. Modern physics research is always keen on the experiments of major projects while neglecting logical tests. Experimental observations without causality or even generated data have been publicized to verify the theory that is actually wrong[37-39]. This is the fundamental reason for the stagnant development of theoretical physics in recent decades. Most of the calculation of the teratogenic simplified solution is invalid rather than wrong, which means that the calculation of each step is in accordance with the mathematical rules except for the "decoupling". However, the phenomenon of distorting mathematics, concealing errors and fabricating observation data in modern physics is very serious. The reason why I have analyzed in detail the acts of invalid calculation, incorrect calculation, conclusive falsification and experimental report falsification in modern physics is that I hope that the disclosure of cunning pseudoscientific acts will no longer be subjected to unprovoked attacks and slanders. Present the correct calculation results and conclusions to the world, and the future mainstream ethical scientists will objectively comment. In the future, the scientific world would not have been as dark as in the past and now.

Since 1985, we have revealed and corrected some mathematical errors implied in theoretical physics. In a few published articles in Chinese[40] and English[41], the description of such problems is relatively euphemistic, and there is no clear explanation that some calculations are wrong, which may be a reason for failing to attract attention. To reveal some problems existing in theoretical physics, we usually need to make many aspects of argumentation and more than ten kinds of calculations. Only when the results are consistent can we give a conclusion. These problems are found in testing relevant logic with the unitary principle, some are qualitative tests, and some are quantitative tests. However, it will take quite a long time to widely test and correct the mathematical errors and specious conclusions implied in theoretical physics. Using Wolfram Mathematica to test the absence of the solution of teratogenic simplified Dirac recursive relation set, which created a precedent for the machine to test the theoretical physics conclusion, and pointed out a bright way to correct mathematical errors implied in theoretical physics[42]. If the computer's negation of the teratogenic simplified Dirac equation is still in doubt, then people should find the reason why the computer proves that the teratogenic simplified Dirac equation has no solution. This will not only give a final conclusion to this problem, but also will test the systematic program of theoretical physical logic by machine, and even produce a universal method similar to the machine proof of geometric theorem[43, 44], which can be used to widely test physical theory. Of course, now the most urgent need for theoretical physics is to face up to the fact that because simple mathematics has been ignored, physical theory may have been creating the desired results in some incorrect logic for nearly a hundred years, and therefore missed those correct theories and important scientific inferences[45].

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