Quantum Numbers，Quantum Superposition Numbers and Non-rational Numbers and Their Applications

Zhi Li and Hua Li

(Franklin.Li@aliyun.com，lihua2057@aliyun.com)

Abstract:

In the process of solving the roots of higher-order equations, it is found that the numbers with multi-layer radical forms obtained by special methods are not the roots of the equations, but only the approximate values of the roots of the equations. It is found that the numbers formed by the square root of non-rational numbers are inaccurate numbers. Among them, quantum numbers can be directly proved to be unordered. Further research has found quantum superposition numbers. This new discovery breaks the view that "numbers are accurate". New research shows that the rational numbers in the

real number system have some non-rational counterparts. The non-rational numbers are those that cannot be expressed as ratios of integers but are roots of polynomials with rational coefficients.

The numbers with double-layer square roots obtained by solving the equations by the Cardan method are inaccurate numbers. They are not real numbers under the classical definition, but only approximate values of the roots of the equations. The mainstream view is that the roots of the equations belong to the real numbers under the classical definition, which proves the general formula that there are no roots for cubic equations of one variable, and at the same time proves that the Galois group theory is wrong in its discussion of the roots of equations. In the function of finding non-trivial zeros in the Riemann hypothesis, there are a large number of square roots of transcendental numbers π, which are similar to multi-layer radical numbers. These numbers are not real numbers under the classical definition, and have no accurate values. After participating in the operation, the calculation results must not be zero. Therefore, it can be proved that there is no "non-trivial zero point" and no polynomial root with a real part value of 1/2, which negates the Riemann hypothesis.

The discovery and proof of quantum numbers and quantum superposition numbers have broadened human thinking about the nature of nature. It

provides a reference for human understanding of the behavior of the microscopic world, making our understanding of mathematics, physics and even the entire universe more profound and comprehensive.

The discovery and proof of quantum numbers and quantum superposition numbers reveal the ultimate mystery of the universe. That is, some laws of the universe cannot be perfectly expressed by functions, nor can they be accurately expressed by mathematical formulas. Some conclusions derived from quantum numbers are consistent with current quantum theory.

Keywords:

quantum number, quantum superposition number, equation root, Galois group theory, Riemann hypothesis, non-rational numbers, number system, quantum number conjecture

Thousands of years ago, humans had the concept of numbers, and to this day, humans continue to conduct in-depth and unremitting research on numbers. With the development and progress of the times, humans' understanding of numbers has continued to deepen, and the types of numbers have become richer.

In the process of solving the roots of higher-order equations, it was found that the numbers in the form of multi-layer radicals obtained by special methods are not the roots of the equations, and the numerical calculation results are only approximate values of the roots of the equations. It is found that the numbers formed by the square root of irrational numbers do not have accurate values and are inaccurate numbers [1]. Among them, quantum numbers can be directly proved to have no ordering properties. Further research has discovered quantum superposition numbers. This discovery breaks the view that "numbers are accurate."

1. Proof of quantum numbers

1.1. Proof method

Assume that multi-level square roots are real numbers under the classical definition and have exact numerical values.

$$\mathbf{w=\sqrt{3-b}}$$

where:

b=√(9&9477+√(89813529-t^9))+√(9&9477-√(89813529-t^9))

t=30/4+1/4((4m+189)√(378+8m)-√(-128m^3-6048m^2+(14688 m+694008)√(378+8m)+285768m+13502538))/(189+4m)

m=3/4 ∛(-25236+4√41629613) -3/4 ∛(25236+4√41629613) -63/4

For the two double square roots in the number m are already in the simplest form and cannot be simplified to rational numbers, the numbers t, b and w cannot be simplified， they are not rational numbers.

Therefore, it is proved that the number b is not the same as the rational number 3.

Now calculate the values of b and w with different number of digits in floating point numbers.

Digits = 25

b = 2.999999993416757061156282

w = 0.00008113718591893434653642264

Digits = 30

b = 3.00000000000019193490985194345

w = 4.3 8103766078247094997441076693*10^(-7) I

where: I is the imaginary unit.

Digits = 35

b = 2.9999999999999999980155680532155316

w = 1.4086986713930230721590326767443496*10^(-9)

The above results show that the results of b calculated with different precisions are different, and there is no trend of approaching the rational number 3 from a direction less than or greater than it. The correct way to prove whether two numbers are the same is to simplify them to the simplest form and then compare them. If the simplest form is exactly the same, they are the same number. Obviously, b and 3 are not the same number.

The interval between any two real numbers under the classical definition increases accordingly with the increase of precision, and the number of digital intervals at this precision tends to infinity. However, the two numbers b and 3 are always less than 10^20 digits within any calculation accuracy. No matter how the calculation accuracy is improved, even to astronomical numbers, the number of digital intervals between the two numbers remains stable and does not increase or decrease accordingly, indicating that there may be other numbers between the two, but the number does not exceed 10^20.

The mainstream view is that real numbers under the classical definition have density, order and continuity, and there is a one-to-one correspondence with the points on the number axis. The two real numbers can be compared. Now the numerical calculation results of b with different precisions show that the value of b is sometimes greater than 3 and sometimes less than 3. There is no trend of unidirectional convergence and it cannot correspond to the only point on the number axis; b does not belong to any of the two real number sets greater than 3 or less than 3; b and 3 are not the same number, but they cannot be compared; b and 3 seem to be entangled. No matter how the calculation accuracy is improved, the possible numbers between the two are always less than 10^20, and there are no infinite numbers.

The same number w is calculated with different precisions, sometimes as a real number and sometimes as an imaginary number, and cannot correspond to a unique point on the number axis; the number w does not belong to either the real number or the imaginary number set.

This result contradicts the assumption that multi-layer square roots are real numbers under the classical definition and have accurate numerical values, and contradicts the uniqueness, order, density and continuity of real numbers under the classical definition, and violates the completeness axiom of real numbers.

1.2. Conclusions

Multi-layer square roots, which are numbers formed by taking square roots of irrational numbers, are not real numbers in the classical sense and have no exact value. Multi-layer square roots that can be directly proven to be unordered can be defined as quantum numbers.

2. Proof of quantum superposition number

Quantum numbers have the same phenomenon as physical matter quanta, both of which are uncertain and have no exact value. Special types of quantum numbers, where both the numerator and denominator are quantum numbers, have more quantum superposition characteristics. Only when people select floating-point digits to calculate them, the so-called "collapse" occurs and a fixed value is presented.

2.1 Assumptions

Z=(√(9&247+√(61009-h^9))+√(9&247-√(61009-h^9))-2)/(√(9&9477+√(89813529-t^9))+√(9&9477-√(89813529-t^9)-3))

where:

h=10/3+1/18 ((9n+84)√(168+18n)-√(-1458n^3-13608n^2+(9792n+91392)√(168+18n)+127008n+1185408))/(28+3n)

t=30/4+1/4((4m+189)√(378+8m)-√(-128m^3-6048m^2+(14688m+694008)√(378+8m)+285768m+13502538))/(189+4m)

m=3/4 ∛(-25236+4√41629613) -3/4 ∛(25236+4√41629613) -63/4

n=1/3 ∛(-2220+√5155381) -1/3 ∛(2220+√5155381) -28/9

2.2 The numerical results of quantum numbers Z calculated with different number of digits in floating point numbers are shown in Table 1.

Table 1 Numerical results of quantum numbers Z with different floating point digits

number of digits	calculated value
21	−21.9429087298718998705
22	−4.2848237254111146851439
23	3.41622945852276798254 66
24	−0.314468726752117288753167
25	51.292149506191766973636 62
26	−2.282220489258574600280 6458
27	1.47857411967326984415973813
28	2.631798468723020563965562491
29	0.2438175202382850781800939 7867
30	11.684322417692183752560509 6455
31	10.734331283103517091256922 23886

2.3. Conclusions

Quantum superposition means that a quantum system can be in a superposition state of different quantum states. The famous "Schrödinger's cat" theory was once vividly expressed as "a cat can be both alive and dead at the same time."

The above results prove that special types of quantum numbers whose numerators and denominators are both quantum numbers have more quantum superposition characteristics. Their numerical calculation results fluctuate within a certain range, sometimes positive and sometimes negative, and only present a fixed value when the number of floating-point bits is selected for calculation, which can be defined as a quantum superposition number.

3. Application of quantum numbers and quantum superposition numbers

3.1 Proving that there is no universal formula for the roots of a cubic equation

The number obtained by the Cardan method to solve a cubic equation must generally have a double root number that cannot be simplified. The simplest and only correct way to determine whether the number obtained by solving an equation is the root of the equation is to bring it back to the left side of the equal sign of the original equation and simplify it to the simplest form. If the simplest form is zero, then the number is the root of the equation; if it is not zero, then the number must be a false root or an approximate value, not the root of the equation. Since the double root number obtained by the Cardan method to solve the equation does not have an accurate value and is not a real number under the classical definition, it cannot be simplified to zero when brought back to the left side of the original equation. It is not the root of the equation, but only an approximate value of the root of the equation.

The new discovery of quantum numbers fully proves that there is no universal formula for the root of a cubic equation.

3.2 Proving that Galois group theory has errors in its discussion of the roots of equations

Galois group theory believes that there is no general formula for roots of equations of degree 5 or higher, but there is a general formula for roots of equations of degree 4 and cubic. Now it is found that there is no general formula for the roots of cubic equations, proving that Galois group theory has errors in its discussion of the roots of equations.

The number of double-layer roots obtained by the Cardan method is similar to the value obtained by the iterative method, and there is no problem in the actual application of calculating the approximate solution of the roots of equations. However, the nature of numbers is different, and the theory established on the basis of wrong understanding has certain problems.

3.3 Proof of the disconfirmation of the “Riemann hypothesis”

The function for finding non-trivial zeros in the "Riemann Hypothesis" is [2]

$$Z(t)=2\sum_{n^2<(\frac{t}{2\pi})} n^{-\frac{1}{2}}\cos(\theta(t)-t\ln(n))+R(t)$$

where:

$$\theta(t)=\frac{t}{2}\ln(\frac{t}{2\pi})-\frac{t}{2}-\frac{\pi}{8}+\frac{1}{48t}+\frac{7}{5760t^3}+...$$

$$R(t)\sim(-1)^{N-1}(\frac{t}{2\pi})^{-\frac{1}{4}}[C_0+C_1(\frac{t}{2\pi})^{-\frac{1}{2}}+C_2(\frac{t}{2\pi})^{-\frac{2}{2}}+C_3(\frac{t}{2\pi})^{-\frac{3}{2}}+C_4(\frac{t}{2\pi})^{-\frac{4}{2}}]$$

The above functions contain a large number of square roots and trigonometric operations of transcendental numbers π, similar to multi-layer square roots. Since such numbers do not have accurate values and are not real numbers under the classical definition, the result of the calculation after multiple numbers are involved in the calculation must not be zero.

In addition, when different floating-point digits are selected in the presence of inaccurate numbers, the variable values obtained when the function value is zero are completely different. That is, when the variable value obtained by selecting a certain floating-point digit is used to calculate the function value using other floating-point digits, the function value is not zero at this time.

In summary, it can be proved that there is no "non-trivial zero point" and there is no problem of polynomial roots with the real part value of 1/2, which negates the Riemann hypothesis.

3.4 Proving that there are design flaws in counting system

The above results prove that humans do not fully understand the properties of irrational numbers. The definition of classical irrational numbers is a number that cannot be expressed as the ratio of two integers. Now it has been discovered and proved that quantum numbers and quantum superposition numbers are not real numbers under the classical definition. In addition, the definition of classical irrational numbers has defects in the number system, which makes it difficult to know where algebraic numbers and transcendental numbers are in the classical number system. There is reason to believe that the number system needs to be re-understood and modified.

A new number system is recommended as follows in Figure 1:

non-rational numbers: they cannot be expressed as the ratio of two integers, but are roots of polynomials with rational coefficients.;

inaccurate numbers: they can be expressed by numbers and operation symbols such as addition, subtraction, multiplication, and division, but they do not have exact values.

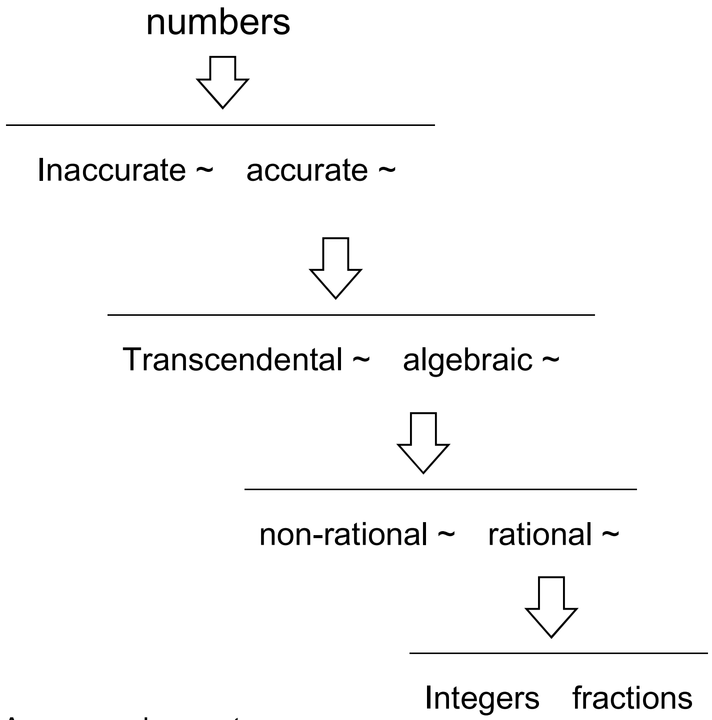

Figure 1. A new number system.

3.5 Proving that mathematics has some limitations and is not complete

It has been proved above that the double square root obtained by solving a cubic equation is not the root of the equation, but only an approximate value of the root of the equation. Therefore, it can be concluded that when a mathematical formula contains similar multi-square root numbers, the calculation result may be inaccurate. Part of the reason for the inaccurate calculation result is the number itself, not the calculation method.

The application of the Pythagorean theorem, when two of the sides of a right triangle are irrational numbers, find the length of the other side. At this time, the length of the side to be found may be a double square root number.

However, the double square root number is an inaccurate number and has no accurate value, which proves that the Pythagorean theorem is not complete. That is, the Pythagorean theorem is only valid when the three sides of the triangle are all rational numbers.

From this, it can be proved by contradiction that there are only rational numbers on the number axis, and the number axis is discontinuous. Because if there are irrational numbers on the number axis and it is continuous, the points on the number axis are all composed of specific numbers, and there is a unique and definite result. Then non-parallel lines must intersect at one point, and the number calculated by the Pythagorean theorem must have a definite and unique value.

At the same time, it is proved that square root is a function operation, just like trigonometric function operation and series operation. When the square root cannot calculate the final result, it is not a specific number. At this time, the number formed by the square root is essentially always in operation, and only when the accuracy requirement is given can a definite result be presented. However, there are multiple operations for multi-layer square roots, so uncertain results will be produced.

It can be further proved that the fifth postulate of Euclidean geometry is wrong.

That is, a straight line is composed of discrete and certain points, and the probability of two straight lines intersecting in a plane is almost zero.

4.Discussions

Mathematics has always been considered very rigorous, but now the existence of quantum numbers and quantum superposition numbers has been discovered and proven. Logical reasoning proves that inaccurate numbers, quantum numbers and quantum superposition numbers are not on the number axis. Double square roots can be considered as double-layer composite function operations, similar to the two changing trends of the prime number function [3][4][5]. The number of prime numbers cannot be accurately expressed by functions, and conversely, double square roots do not have accurate values.

The discovery and proof of quantum numbers and quantum superposition numbers have broadened human thinking about the nature of nature, provided a reference for human understanding of the behavior of the microscopic world, and made our understanding of mathematics, physics and even the entire universe more profound and comprehensive.

The discovery and proof of quantum numbers and quantum superposition numbers have revealed the ultimate mystery of the universe. That is, some cosmic laws cannot be perfectly expressed by functions, nor can they be accurately expressed by mathematical formulas. It can be considered that quantum numbers and quantum superposition numbers are the mathematical basis of quantum theory. Quantum superposition numbers exist objectively, but their values depend on the precision selected by people to calculate them. Just as the position of microscopic particles is an objective existence, but its specific position depends on human measurement of them.

In a sense, straight lines only exist in the macroscopic world, while the microscopic world is a quantum state. A series of conclusions derived from quantum numbers are consistent with current quantum theory.

5. Quantum Number Conjecture

$$\sqrt[n]{q+\sqrt{p-t}}+\sqrt[n]{q-\sqrt{p-t}}$$

where n is a positive integer, q and p are rational numbers, and the numerical calculation results gradually approach an integer m as the calculation accuracy increases.

If the number cannot be simplified to the integer m, then the number must be a quantum number, there is no unidirectional approach phenomenon, and the number t must be an inaccurate number.

6. References

[1] Zhi Li and Hua Li.Uncertainty in Multi-layer Radical Calculations and Inaccurate Numbers. https://vixra.org/abs/2201.0055

[2] Zhi Li and Hua Li. Negative Proof of Riemann's Hypothesis. https://vixra.org/abs/2205.0089

[3] G. H.Hardy and E. M. Wright. An Introduction to the Theory of Numbers, 6th ed., Oxford University Press, 2008

[4] https://mathworld.wolfram.com/PrimeCountingFunction.html

[5] Zhi Li and Hua Li.A Modified Formula of Function Li (x) for Prime Number Counting. https://vixra.org/abs/2301.0136