Peertechz

Annals of Mathematics and Physics
MATHEMATICS AND PHYSICS GROUP
mathematics@peertechz.us
ANNALS OF Mathematics and Physics OPEN ACCESS JOURNAL
ISSN: 2689-7636 DOI: https://dx.doi.org/10.17352/amp

Research Article

The continuity of prime numbers can lead to even continuity (Relationship with Gold Bach's conjecture)

Xie Ling*

College of cosmic mathematics and physics, China

Received: 24 January, 2022
Accepted: 01 December, 2022
Published: 02 December, 2022

***Corresponding author:** Xie Ling, College of cosmic mathematics and physics, China, Tel: 13973920402, E-mail: 29997609@qq.com; xieling1968@hotmail.com

ORCID: https://orcid.org/0000-0002-1957-603X

Keywords: Prime even continuity; Bertrand chebyshev theorem; Ascending and descending; Extreme law; Mathematical complete induction

Abstract

N continuous prime numbers can combine a group of continuous even numbers. If an adjacent prime number is followed, the even number will continue. For example, if we take the prime number 3, we can get an even number 6. If we follow an adjacent prime number 5, we can get even numbers by using 3 and 5: 6, 8 and 10. If a group of continuous prime numbers 3, 5, 7, 11, ..., P, we can get a group of continuous even numbers 6, 8, 10, 12,..., 2n. Then if an adjacent prime number q is followed, the Original group of even numbers 6, 8, 10, 12,..., 2n will be finitely extended to 2(n + 1) or more adjacent even numbers. My purpose is to prove that the continuity of prime numbers will lead to even continuity as long as 2(n + 1) can be extended. If the continuity of even numbers is Discontinuous, it violates the Bertrand Chebyshev theorem of prime Numbers.

Because there are infinitely many prime numbers: 3, 5, 7, 11,...

We can get infinitely many continuous even numbers: 6, 8, 10, 12,...

Get: Gold Bach conjecture holds.

2020 Mathématiques Subjectif Classification: 11P32, 11U05, 11N05, 11P70.

Research ideas:

If the prime number is continuous and any pairwise addition can obtain even number continuity, then Gold Bach's conjecture is true.

Human even number experiments all get (prime number + prime number).

I propose a new topic: the continuity of prime numbers can lead to even continuity.

I designed a continuous combination of prime numbers and got even continuity.

If the prime numbers are combined continuously and the even numbers are forced to be discontinuous, a breakpoint occurs.

It violates Bertrand Chebyshev's theorem.

It is proved that prime numbers are continuous and even numbers are continuous.

The logic is: if Gold Bach's conjecture holds, it must be that the continuity of prime numbers can lead to the continuity of even numbers.

Image interpretation: turn Gold Bach's conjecture into a ball, and I kick the ball into Gold Bach's conjecture channel.

There are several paths in this channel and the ball is not allowed to meet Gold Bach's conjecture conclusion in each path.

This makes the ball crazy, and the crazy ball must violate Bertrand Chebyshev's theorem.

Citation: Ling X (2022) The continuity of prime numbers can lead to even continuity (Relationship with Gold Bach's conjecture). Ann Math Phys 5(2): 171-179. DOI: https://dx.doi.org/10.17352/amp.000062

Introduction

Background of the study

Gold Bach conjecture [1]: Euler's version, that is, any even number greater than 2 can be written as the sum of two prime numbers, also known as "strong Gold Bach conjecture" or "Gold Bach conjecture about even numbers".

It was put forward in 1742 and today it has trapped excellent mathematicians of mankind.

Is this Gold Bach conjecture correct? Or wrong?

Why can't humans find a way to prove or falsify?

It is because human beings do not find the right path by definition and human beings have gone astray.

Purpose of the study

Starting with the definition, find out the internal relationship between Gold Bach conjecture and mathematical logic,

Confirm Gold Bach conjecture or deny Gold Bach conjecture.

Prove the distribution law of prime numbers.

The summary of the existing literature proves that the study of the Gold Bach conjecture is correct.

Text: Introduction

Research skills: The whole proof begins with the ascent

1.1.1 Even number generation provisions in this paper

Rule (1)**:** the minimum odd prime number is 3

Rule (2)**:** add two odd prime numbers (any combination of two odd primes).

Rule (3)**:** odd prime number can be quoted repeatedly.

Rule (4)**:** meet the previous provisions, and all prime combinations to the maximum (for example, 10 = 5 + 5 must be: 10 = 5 + 5 = 3 + 7,

For another example, the combination of 90 must be: 90 = 43 + 47 = 37 + 53 = 31 + 59 = 29 + 61 = 23 + 67 = 19 + 71 = 17 + 73 = 11 + 79 = 7 + 83).

Rule (5)**:** $P_a + P_b = 2S$, and $P_b + P_a = 2S$, Delete one and leave only one.

1.1.2 I can quote the minimum odd prime number 3

The results are as follows

3+3=6

5 + 1 = 6 (it is stipulated that 1 is not a prime number, which is deleted because it violates regulation 2)

∴ The unique formula: 3 + 3 = 6(comply with Rule (4): all prime numbers are quoted to the maximum). 3 → 6

1.1.3 **Even number generation provisions in this paper:** Get the following

{3} → (3+3) =6

{3, 5}→ (3+5) =8

{3, 5}→ (5+5) =10 → (3+7) → {7} → {3, 5, 7}

{3, 5, 7}→ (5+7) =12

{3, 5, 7}→ (7+7) =14 → (3+11) → {11} → {3, 5, 7, 11}

{3, 5, 7, 11}→ (11+5) =16 → (3+13) → {13} → {3, 5, 7, 11, 13}

Look prime continuous 3→5→7→11→13

Look: you get "even numbers are also continuous" 6→8→10→12→14→16

If you let the prime number be infinitely continuous: 3→5→7→11→13→17→...

"Even numbers are also infinitely continuous": 6→8→10→12→14→16→18→...

A new theorem is obtained: The continuity of prime numbers can lead to even continuity.

If this theorem is proved, Gold Bach's conjecture is correct.

The proof process uses the known prime number,

Continuity of prime numbers:

∵ The theorem of an infinite number of primes [2]:

(1) There is no maximum prime;

(2) After each prime, you can always find an adjacent prime.

∴ Prime numbers have continuity.

Prime number theorem [2] and Bertrand Chebyshev [3] theorem.

By quoting the prime theorem (Each prime has a subsequent adjacent prime.), we obtain the unrestricted continuity of prime numbers, and then generate even numbers according to the requirements of this paper, If the generated even number is infinitely continuous, Gold Bach's conjecture is correct.

Use the limit rule to force the even number to terminate at 2n= (Prime) + (prime), and the even number 2n + 2= (Prime) + (prime) cannot occur.

Conclusion

If it conforms to mathematical logic, then: the Gold Bach conjecture is wrong.

If it does not conform to mathematical logic, then Gold Bach's conjecture is correct.

Citation: Ling X (2022) The continuity of prime numbers can lead to even continuity (Relationship with Gold Bach's conjecture). Ann Math Phys 5(2): 171-179. DOI: https://dx.doi.org/10.17352/amp.000062

Nouns and definitions

2.1 {Definition of prime number: prime number refers to the natural number with no other factors except 1 and itself in the natural number greater than 1.}Record: (2.1)

2.2 {Extreme settings: A may or may not be true. What conclusion can we get if we only prove that A is not?

{A|A=x, A=y}, (A=x) ⇨ (QED). Take: A ≠ x, only prove the A=y conclusion.} Record: (2.2)

2.3 {[References cited [3]] Bertrand Chebyshev theorem: if the integer n > 3, then there is at least one prime p, which conforms to n < p < 2n−2. Another slightly weaker argument is: for all integers n greater than 1, there is at least one prime p, which conforms to n < p < 2n.} Record: (2.3)

2.4 {the generation of even and prime numbers in this paper is specified as follows:

In this paper, the even number generation rules: the following five rules are met at the same time.

(1) Only odd primes are allowed as elements.

(2) Only two prime numbers can be added. (Any combination of two odd primes).

(3) Two prime numbers can be used repeatedly: (3 + 3), or (3 + 5), or (p + p).

(4) meet the previous provisions, and all prime combinations to the maximum (for example, 10 = 5 + 5 must be: 10 = 5 + 5 = 3 + 7,

For another example, the combination of 90 must be: 90 = 43 + 47 = 37 + 53 = 31 + 59 = 29 + 61 = 23 + 67 = 19 + 71 = 17 + 73 = 11 + 79 = 7 + 83).

(5) Take only one of (p_a+p_b) and (p_b+p_a).

In this paper, the generation rules of prime numbers: the following three rules are met at the same time.

(1) The first odd prime number is 3.

(2) Get the prime number from the even number. For example, 3 + 5 = 8. Prime numbers 3 and 5 are the materials I can cite.

(3) Get the prime number from the even number. It must be two prime numbers. For example, 3 + 5 = 8. In the combination of the even number 8, the prime numbers 3 and 5 are the materials I can cite.

For example, 1 + 7 = 8. In the combination of even number 8, I cannot quote prime number 7.} Record: (2.4)

A pseudo stop property is obtained in (2.4):

2.4.1 {Pseudo stop: Explain first. the first prime number 3, according to the even number generation regulations, gets 3 + 3 = 6. Even number 6, according to the prime generation regulations, cannot generate 5, because (1 + 5) does not meet the even number 6 in this paper, and cannot generate quality 5. So there is a false stop: only 3, no 5, only 6, no 8. But you can artificially increase the prime number 5, and you can also get 8 (3 + 5). So it is a false stop.

Pseudo-stop definition:

(1) The maximum even number among the continuous even numbers composed of k consecutive prime numbers {3, 5, 7, 11,...,p_1} is 2n

(2) {3, 5, 7, 11,...,p_1} can meet: {6, 8, 10, 12, 14, 16, 18, 20,..., 2n}

(3) {3, 5, 7, 11,...,p_1} not satisfied: {2n + 2}

(4) Odd prime p_o: $p_o \notin$ {3, 5, 7, 11,..., p_1}, satisfying: 2n + 2=p_o+p_y.} Record: (2.41)

2.42 {True stop: two prime numbers p_1 and p_2, satisfying: p_1 + p_2 = 2n. Any two prime numbers p_X and p_y cannot satisfy: p_X + p_y = 2n + 2.} Record: (2.42)

{Friendly tip: if you prove the real stop (p_x+p_y ≠2n+2), you prove that the "Gold Bach conjecture" is not tenable.}

2.5 {[References cited [2]] the theorem of an infinite number of primes:

The n-bit after each prime can always find another prime.

For example, 3 is followed by 5, and 13 is followed by 17; There must be an adjacent prime p_i after the prime p.} Record: (2.5)

2.6 {here we only discuss the following cases: prime number sequence and even number sequence

(2.5) ⇒ Prime number sequence: 3, 5, 7, 11, 13, 17, 19, 23,...

Even number sequence: 6, 8, 10, 12, 14, 16, 18, 20,...

Explain (2.6) in today's words: the prime number in the prime number sequence discussed in this paper is adjacent and continuous, and the first number is 3.

An even number in an even number sequence is contiguous and the first number is 6.} Record: (2.6)

2.7 {remember: all the primes I'll talk about below refer to odd primes (excluding 2). Prime symbol p, different primes use p_1, p_2, p_3,..., p_x} record: (2.7)

Logical discussion (argument) and results

3.1 {Gold Bach conjecture [1]:3≤∀n∈N, 2n=P_X+P_y. set up$\triangle_1$:p_x≥p_y} record: (3.1)

3.2 {Theorem: the continuity of prime numbers leads to the continuity of even numbers.

In mathematical language:

Known: {3,5,7,11,13,...,p_2,p_1,p_o}∈ (prime), The next neighbor of p_1 is p_o.

Citation: Ling X (2022) The continuity of prime numbers can lead to even continuity (Relationship with Gold Bach's conjecture). Ann Math Phys 5(2): 171-179. DOI: https://dx.doi.org/10.17352/amp.000062

$3<5<7<11<13<\dots p_2<p_1<p_0$.

{6, 8, 10, 12, 14, 16,... 2n}∈ (Continuous even number).

If : $\{3,5,7,11,13,\dots,p_2,p_1\}\Rightarrow\{6,8,10,12,14,16,\dots,2n\}$.

inevitable: $\{3,5,7,11,13,\dots,p_2,p_1,p_0\}\Rightarrow$

{ 6,8,10,12,14,16,...,2n,2(n+1)}.}Record: (3.2)

3.2.1 Prove:

Humans use computers to calculate a finite number of even numbers: {6, 8, 10, 12, 14,...,2n} every even number satisfies (3.1).

The computer process is finite {6, 8, 10, 12, 14,...,2n}

It is not logically proved that any even number greater than 4 satisfies (3.1).

((2.5) + (2.6)) take odd prime sequence: 3, 5, 7, 11, 13, 17, 19, 23,...

Take the minimum prime number 3 from the front of the prime sequence,

A_1: {(2.1) + (2.4) + {3}}⇒

{3+3=6} It is recorded as A_1

→6

According to the rule, 3 can only get {3+3=6}

Nonexistence: 5+p=6

{Because 1 in 5+1=6 is not defined as a prime number. If 1 is defined as a prime number, this paper will come to the same conclusion}

Note: 5∉{3}.

Prime number 3, limit is used according to (2.4), cannot be: 6→8.

{(2.1) + (2.4) + {3}}⇒ prime number 3 can only get even number 6.

A pseudo-stop occurred (2.41).

If you want to: 6→8, you must add an adjacent prime number 5.

∴ {3, 5}

⇒ 3→5

A_2: {(2.1) + (2.4) + {3, 5}}⇒

3+3=6

3+5=8

5+5=3+7=10 ∵ {10} ⇒{7} ∴ {3, 5, 7}⇒

7+5=12

7+7=11+3=14. ∵ {14} ⇒{11}. ∴ {3, 5, 7, 11}⇒

11+5=13+3=16 ∵ {16} ⇒{13}. ∴ {3, 5, 7, 11, and 13}}⇒

11+7=13+5=18.

13+7=17+3=20. There is a new prime number 17 in continuity.

Note: {(13+7), (17+3)} ∈20. Even numbers⇒: 6, 8, 10, 12, 14, 16, 18, 20.

Prime numbers are continuous, and there is a new prime number 17.

3→5→7→11→13→17.

Even numbers⇒: 6→8→10→12→14→16→18→20.

Wonderful continuity:

{{{3,5} → {6,8,10}.

{10} → (10 = 3 + 7) → 7} → {3, 5, 7}}.

{{3,5,7} → {6,8,10,12,14}.

{14} → (14 = 3 + 11) → 11} → {3, 5, 7, 11}}.

{{3,5,7,11} → {6,8,10,12,14,16}.

{16} → (16 = 3 + 13) → 13} → {3, 5, 7, 11, 13}}.

{{3,5,7,11,13} → {6,8,10,12,14,16,18,20}.

{20} → (20 = 3 + 17) → 17} → {3, 5, 7, 11, 13, 17}}.

{{3,5,7,11,13,17} → {6,8,10,12,14,16,18,20,22}.

{22} → (22 = 3 + 19) → 19} → {3, 5, 7, 11, 13, 17, 19}}.

{{3,5,7,11,13,17,19} → {6,8,10,12,14,16,18,20,22,24,26}.

{26} → (26 = 3 + 23) → 23} → {3, 5, 7, 11, 13, 17, 19, 23}}.}.Wonderful continuity is obtained: prime continuity, resulting in a new even continuity, and a new even number results in a new prime continuity.

According to the rule (2.4) and the existing computer capabilities, the prime number 23 should be continuous to the subsequent prime number,

According to the rule (2.4) and the existing computer capacity, the even number 26 should be continuous to the following even number,

A_2 has not stopped at this time.

Note the key point:

A_1 pseudo stop, increase the adjacent prime number **5** to have A_2.

From A_1→A_2→ is it always infinite? Or will it stop?

Here's the wonderful thing:

Citation: Ling X (2022) The continuity of prime numbers can lead to even continuity (Relationship with Gold Bach's conjecture). Ann Math Phys 5(2): 171-179. DOI: https://dx.doi.org/10.17352/amp.000062

(Analysis I):

Always Unlimited: $A_1 \to A_2 \to$ ...

There are :((2.5) + (2.6) ⇒ 3,5,7,11,13,17,19,23,...

Get: 6,8,10,12,14,16,20,22,...

Conclusion: (3.2) (QED).

(2.2) ⇒ Stop at A_n, cannot continue.

(Analysis II): Stop at A_n, not to be continued.

Stop at $A_{n:}$ $A_1 \to A_2 \to \dots \to A_n$

K -line with continuous Prime: 3,5,7,11,13,17,19,23,... ,p_2,p_1

Get: 6,8,10,12,14,16,20,22,...,2 (n-1) ,2n

Terminate at A_n to obtain:

{{ {(2.1)+(2.4)+{3,5,7,11, ... ,$p_{2,}$ p_1} ⇒ {6,8,10,12,... ,2(n-1),2n} ⇒

⇒ {6,8,10,12,...,2 (n-1) ,2n} ∈A_n}} record: (3.3)

Terminate at A_n to obtain:

{{ {(2.1)+(2.4)+{3,5,7,11, ... ,$p_{2,}$ p_1} ⇏ 2(n+1)} ⇒ {2(n+1)} ∉ A_n}} record: (3.4)

{ Let: prime p satisfy: p∉{3,5,7,11, ...,$p_{2,}$ p_1}, (3.3) ,(3.4) .

∴ {p_1<p, (p+∀p) ∉{6,8,10,12,... ,2 (n-1) ,2n}, (p+∀p) ∉ A_n}} (1)

Take the prime number that is greater than p_1 and adjacent to p_1 as p_0,

∵ (1) ⇒{p_0+3≠2n ,p_0+3≮2n}

∴ p_0+3>2n

∴ p_0+2≥2n ∵ (odd) ≠ (even)

∴ p_0+2>2n ⇒ p_0+1≥2n Record as (W)

Starting from (Analysis II)

The principle of mathematical complete induction:

It is correct in the front, until A_n.

Take the continuous prime number {3, 5,7,11,...,$p_{2,}$ p_1} from small to large.

A_n : {(2.1)+(2.4)+{3,5,7,11, ... ,$p_{2,}$ p_1}}⇒

{3+3=6

5+3=8

7+3=5+5=10. Set up: (7+3=5+5) sequence: 7>5

7+5=12

11+3=7+7=14. Set up$\triangle_2$: (11+3=7+7) sequence: 11>7

13+3=11+5=16. Set up$\triangle_2$: (13+3=11+5) sequence: 13>11

13+5=11+7=18. Set up$\triangle_2$: (13+5=11+7) sequence: 13>11

17+3=13+7=20. Set up$\triangle_2$:(17+3=13+7) sequence: 17>13

19+3=17+5=11+11=22. Set up$\triangle_2$: (19+3=17+5=11+11) sequence: 19>17>11

19+5=17+7=13+11=24. Set up$\triangle_2$: (19+5=17+7=13+11) sequence: 19>17>13

......

$p_{c1}+p_{c2}=p_{c3}+p_{c4}=\dots=2(n-2)$

$p_{b1}+p_{b2}=p_{b3}+p_{b4}=\dots=2(n-1)$

$p_{a1}+p_{a2}=p_{a3}+p_{a4}=\dots=2n$} It is recorded as A_n

⇒:6,8,10,12,14,16,18, ..., 2(n-1),2n.

In A_n, it is specified: $p_{a1} \geq p_{a2}$

In A_n it is specified that: $p_{a1} > p_{a3}$

{Reason: $p_{a1}+p_{a2}$=2n must exist.

$p_{a3}+p_{a4}$ =2n, not necessarily. If $p_{a3}+p_{a4}$ =2n, exists p_{a1} and p_{a3} if one of them is big, put the big one in the first place according to the regulations.

If: (p_{a1} = p_{a3}) ⇒ ($p_{a1}+p_{a2}$ =2n) ≌ ($p_{a3}+p_{a4}$ =2n)

(2.4) ⇒ Delete duplicate formula {$p_{a3}+p_{a4}$ =2n}. ∴ $p_{a1} > p_{a3}$

A_n is simplified as B_n.

{3+3=6

5+3=8

7+3=5+5=10.

7+5=12

11+3=7+7=14.

13+3=11+5=16.

13+5=11+7=18.

17+3=13+7=20.

19+3=17+5=11+11=22.

19+5=17+7=13+11=24.

......

$p_{c1}+p_{c2}=p_{c3}+p_{c4}=\dots=2(n-2)$

$p_{b1}+p_{b2}=p_{b3}+p_{b4}=\dots=2(n-1)$

$p_{a1}+p_{a2}=p_{a3}+p_{a4}=\dots=2n$} it is recorded as: B_n

Citation: Ling X (2022) The continuity of prime numbers can lead to even continuity (Relationship with Gold Bach's conjecture). Ann Math Phys 5(2): 171-179. DOI: https://dx.doi.org/10.17352/amp.000062

Change B_n to C_n.

{Level 2(n-2):3+2(n-2) +3=2(n+1)

Level 2(n-3): 5+2(n-3) +3=2(n+1)

Level 2(n-4): 7+2(n-4) +3=5+2(n-4) +5=2(n+1)

Level 2(n-5): 7+2(n-5) +5=2(n+1)

Level 2(n-6): 11+2(n-6) +3=7+2(n-6) +7=2(n+1)

Level 2(n-7): 13+2(n-7) +3=11+2(n-7) +5=2(n+1)

Level 2(n-8): 13+2(n-8) +5=11+2(n-8) +7=2(n+1)

Level 2(n-9): 17+2(n-9) +3=13+2(n-9) +7=2(n+1)

Level 2(n-10):19+2(n-10) +3=17+2(n-10) +5=11+2(n-10) +11=2(n+1)

Level 2(n-11):19+2(n-11) +5=17+2(n-11) +7=13+2(n-11) +11=2(n+1)

......

Level 6:$p_{c1}+6+p_{c2}=p_{c3}+6+p_{c4}=...=2(n+1)$

Level 4:$p_{b1}+4+p_{b2}=p_{b3}+4+p_{b4}=...=2(n+1)$

Level 2:$p_{a1}+2+p_{a2}=p_{a3}+2+p_{a4}=...=2(n+1)$} it is recorded as: C_n

{Friendly note: C_n is Gold Bach's conjecture channel. The branches of this channel are Level 2, level 4, level 6,..., Level 2 (n-3), level 2 (n-2)}

"Line β" in C_n: 2→4→6→8→...→2 (n-5) →2 (n-4) →2 (n-3) →2 (n-2)

In Cn. (Level 2): {p_{a1}, p_{a2}, p_{a3}, p_{a4},...,p_{an}}, any element is modeled as p_a, and each prime is abbreviated as p_a.

In Cn. (Level 4): {p_{b1}, p_{b2}, p_{b3}, p_{b4},..., p_{bn}}, any element is modeled as p_b, and each prime is abbreviated as p_b,

The same analogy follows (at each level).

Important note: in C_n, $p_{a1}>p_{b1}$ and their size relationship is not specified.

3.2.1.1 Theorem (ω_1):

{P_1 and p_o are adjacent prime numbers. $p_o>p_1$} ⇒ $p_o \ngtr 2p_1$. ($2p_1>p_o$)

Proof:

Assumptions: $p_o>2p_1$.

⇒: $p_o>2p_1>p_1$.

(2.3)+ {$p_o>2p_1>p_1$.} ⇒ $p_o>2p_1>p_g>p_1$.

⇒{$p_o>p_g>p_1$.}Contradiction. ∵ (p_1 and p_o are adjacent prime numbers.)

∴ $p_o \ngtr 2p_1$. ∵ $p_o \neq 2p_1$ ((odd) ≠ (even)) ⇒$2p_1>p_o$

Theorem (ω_1) (QED).

3.2.1.2 Theorem (ω_2):

A_n, B_n, C_n, if :{ 2n+2= p_x+p_y. set up$\triangle_1$: $p_x \geq p_y$}

There must be: $p_x = p_o$

Proof:

If: $p_x + p_y$ = 2(n+1) (2)

(w)+ (2): $p_o+3 \geq p_x + p_y$ (3)

{(w): $p_o+1 \geq 2n$ ⇒ $p_o+1+2 \geq 2n+2= p_x+p_y$ ⇒ $p_o+3 \geq p_x+p_y$}

∵ (the smallest prime in κ is 3)

∴ $p_y \geq 3$

∴ (3) ⇒$p_o \geq p_x$ (4)

∵ { (3.4) ⇒{(2.4)+{3,5,7,11, ... , p_2, p_1} ⇏ 2(n+1)= $p_i + p_{ii}$ } (5)

∴ {(1)+(5)⇒ $p_x \notin${3, 5,7,11,..., p_2, p_1} ⇒ $p_x>p_1$ } (6)

{Reason: Hypothesis: $p_x \in${3, 5,7,11,..., p_2, p_1}

∵$p_x \geq p_y$ ⇒{p_x, p_y} ∈{3, 5,7,11,..., p_2, p_1}

{3, 5,7,11,..., p_2, p_1}⇒ $p_x + p_y$ = 2(n+1) Contradiction with (5).

∴ $p_x \notin${3, 5,7,11,..., p_2, p_1} ⇒ $P_X>p_1$}

{(4) + (6)} ⇒ $p_o \geq p_x > p_1$ (7)

Because $p_o > p_1$ and the prime number: p_o and p_1 are adjacent.

{p_o and p_1 adjacent. + (7)} ⇒ ∴ $p_x = p_o$

(ω_2) (QED).

3.2.1.3 Theorem (ω_3):

Known: {A_n, B_n, C_n, (2.2), (2.4), p_1 and p_o are adjacent prime numbers, $p_o>p_1$,

β line: 2→4→6→8→...→2(n-6)→2(n-5)→2(n-4)→2(n-3)→2(n-2)

κ line: 3→5→7→11→13→17→19→ ... →p_2→p_1

(2.2) Extreme law: Not allowed: 2n+2=p_x+p_y } There must be: $p_o - p_1$ >2(n-2)

Proof:

p_1 and p_o are adjacent prime , $p_o>p_1$.

{∵ there is no prime number between p_1 and p_o

∴ P_1 takes precedence over other prime numbers and approaches p_o.

Application

Citation: Ling X (2022) The continuity of prime numbers can lead to even continuity (Relationship with Gold Bach's conjecture). Ann Math Phys 5(2): 171-179. DOI: https://dx.doi.org/10.17352/amp.000062

If: $p_o-p_x=2$, There must be: $p_1 = p_x$

∵ there is no odd number between p_o and p_x, ∵ $p_o>p_1\geq p_x$

If: $p_1\neq p_x$ There must be: $p_o>p_1>p_x\rightarrow p_1$ is even → contradictory ∴ $p_1 = p_x$

If: $p_o-p_x=4$, $p_o-p_1\neq 2$. There must be: $p_1 = p_x$

∵ The integer between p_o and p_x has only an odd number t . ∵ $p_o-2\neq p_1\rightarrow p_1\neq t$

∵ $p_o>p_1\geq p_x$, if: $p_1\neq p_x\rightarrow p_o>p_1>p_x\rightarrow p_1$ is even → contradictory. ∴ $p_1 = p_x$

If: $p_o-p_x=6$, $p_o-p_1\neq 2$, $p_o-p_1\neq 4$. There must be: $p_1 = p_x$

∵ The integer between p_o and p_x has only two odd numbers t, and t_1.

∵ $\{p_o-2\neq p_1, p_o-p_1\neq 4\}\rightarrow p_1\neq \{t, t1\}$

∵ $p_o>p_1\geq p_x$, if: $p_1\neq p_x\rightarrow p_o>p_1>p_x\rightarrow p_1$ is even → contradictory. ∴ $p_1 = P_X$

The same logic is extended (omitted).} Record as (M)

∵ Extreme law (2.2): not allowed: $2n+2=P_X+P_y$

∴ $2n+2\neq p_x+p_y$

Under what conditions does $(2n+2=P_X+p_y)$ not exist?

Only if we find the condition that $2n+2=p_x+p_y$ holds,

Delete these conditions to get: $2n+2\neq p_x+p_y$

What are the conditions for the establishment of $(2n+2=p_x+p_y)$?

If: $2n+2=p_x+p_y$ holds.

$(\omega_2)+(2n+2=p_x+p_y)\Rightarrow 2n+2= p_o+p_y$

Get: $p_x= p_o$

What is the value of prime p_y?

If $2n > 2p_1$, it is in contradiction with (B_n) ∴ $2p_1\geq 2n$

∵ $2p_1\geq 2n \Rightarrow 2p_1+2\geq 2n+2$

∵ $p_o>p_1\Rightarrow p_o\geq p_1+1$ ∵ (odd) ≠ (even)

∴ $p_o>p_1+1>2p_o>2p_1+2$

∵ $\{(2p_o>2p_1+2), (2p_1+2\geq 2n+2)\}$ ∴⇒ $2p_o>2n+2$

∵ $\{(2p_o>2n+2), (2n+2= p_o+p_y)\}$ ∴⇒ $p_o>p_y$

∴ $p_y\in \{3,5,7,11,13,17,19, \ldots, p_2, p_1\}$

∵ $\{3,5,7,11,13,17,19, \ldots, p_2, p_1\}+(2.4)\Rightarrow C_n$

∵ {Level 2, level 4, level 6,..., Level 2 (n-3), level 2 (n-2)} ∈ C_n

∴ $\{3,5,7,11,13,17,19, \ldots, p_2, p_1\}\in$ {Level 2, level 4, level 6, ..., Level 2 (n-3), level 2 (n-2)}

∴ $p_y\in$ {Level 2, level 4, level 6,..., Level 2 (n-3), level 2 (n-2)}

If: $p_y\in$ {Level 2}

$\Rightarrow \{p_y\in p_a\}\Rightarrow (p_y = p_{ai})$. ∴ $2n+2= p_o+p_y\Rightarrow 2n+2= p_o+p_{ai}$

∵ Level 2: p_{ai}

∴ Level 2: $(p_{aii}+2+p_{ai}=2(n+1))\in\{p_{a1}+2+p_{a2}=p_{a3}+2+p_{a4}=\ldots=2(n+1)\}$

$\{(2n+2= p_o+p_{ai}),(p_{aii}+2+p_{ai}=2(n+1))\}\Rightarrow p_{aii}+2=p_o$

$(p_{aii}+2=p_o)+(M)\Rightarrow p_{aii}=p_1$

∴ $(p_{aii}+2=p_o)\Rightarrow (p_1+2=p_o)\Rightarrow (p_o-p_1=2)$

∴Level 2: $\{2n+2=p_x+p_y\}\Rightarrow (p_o-p_1=2)$ Record as (i)

If: Level 2: $p_a+2=p$

$(p_a+2=p)\Rightarrow$ (Level 2) $\Rightarrow p+p_{ai}=2n+2\Rightarrow (p_x+p_y=2n+2)$

$\{(\omega_2)+(p+p_{ai}=2n+2)\}\Rightarrow p_o\in\{p,p_{ai}\}$ ∵(1) $\Rightarrow p_o\notin p_{ai}$

∴ $p = p_o$ ∴ $(p_a+2=p)=(p_a+2= p_o)$

$(M)+(p_a+2= p_o)\Rightarrow (p_1+2= p_o)$ ∴ $p_a= p_1$

∴ $(p_a+2= p)=(p_a+2= p_o)\cong(p_1+2= p_o)$

∴ $(p_a+2= p_o)=(p_1+2= p_o)\Rightarrow (p_x+p_y=2n+2)$

Get: $(p_o-p_1=2)\Rightarrow (p_x+p_y=2n+2)$ Record as (ii)

(i)+(ii) Get: $\{(p_x+p_y=2n+2)\Leftrightarrow (p_o-p_1=2)\}$ Record as (j)

(j) The formula proves that the condition of $(2n+2=p_x+p_y)$ in Level 2 is: $p_o-p_1=2$

(2.2)Extreme laws do not allow $2n+2=p_x+p_y\Rightarrow 2n+2\neq p_x+p_y$

∴$\{(j)+(2n+2\neq p_x+p_y)\}\Rightarrow p_o-p_1\neq 2$. Certifiable:

{If $(j)+(2n+2\neq p_x+p_y)\}$ $\Rightarrow p_o-p_1=2$. (ii) $\Rightarrow$ $(p_x+p_y=2n+2)$, contradicts $(2n+2\neq p_x+p_y)$.

$$∴\{(j)+(2n+2\neq p_x+p_y)\}\Rightarrow p_o-p_1\neq 2 \qquad (8)$$

If: $p_y\in$ {Level 4}

$\Rightarrow \{p_y\in p_b\}\Rightarrow (p_y = p_{bi})$. ∴ $2n+2= p_o+p_y\Rightarrow 2n+2= p_o+p_{bi}$

∵ Level 4: p_{bi}.

∴ Level 4: $(p_{bii}+4+p_{bi}=2(n+1))\in\{p_{b1}+4+p_{b2}=p_{b3}+4+p_{b4}=\ldots=2(n+1)\}$

$\{(2n+2= p_o+p_{bi}),(p_{bii}+4+p_{bi}=2(n+1))\}\Rightarrow p_{bii}+4=p_o$

$(p_{bii}+4=p_o)+(M)+(8)\Rightarrow p_{bii}=p_1$

∴ $(p_{bii}+4=p_o)\Rightarrow (p_1+4=p_o)\Rightarrow (p_o-p_1=4)$

Citation: Ling X (2022) The continuity of prime numbers can lead to even continuity (Relationship with Gold Bach's conjecture). Ann Math Phys 5(2): 171-179. DOI: https://dx.doi.org/10.17352/amp.000062

∴Level 4: $\{2n+2=p_x+p_y\} \Rightarrow (p_o-p_1=4)$

If: Level 4: $p_b+4=p$,

$(p_b+4=p) \Rightarrow$ (Level 4) $\Rightarrow p+p_{bi}=2n+2$ Get:$(p_x+p_y=2n+2)$

$(\omega 2)+(p+p_{bi}=2n+2) \Rightarrow p = p_0$

$\therefore (p_b+4=p)=(p_b+4=p_0)$

$(M)+(8)+(p_b+4=p_0) \Rightarrow (p_1+4=p_0)$. $\therefore p_b=p_1$

$\therefore (p_b+4=p)=(p_b+4=p_0) \cong (p_1+4=p_0)$

$\therefore (p_b+4=p_0)=(p_1+4=p_0) \Rightarrow (p_x+p_y=2n+2)$

Get: $(p_o-p_1=4) \Rightarrow (p_x+p_y=2n+2)$

The same logic leads to: $\{(p_x+p_y=2n+2) \Leftrightarrow (p_o-p_1=4)\}$ Record as (jj)

(jj) The formula proves that the condition of $(2n+2=p_x+p_y)$ in Level 4 is: $p_o-p_1=4$

(2.2)Extreme laws do not allow $2n+2=p_x+p_y \Rightarrow 2n+2 \neq p_x+p_y$

The same logic as (8): $\{(jj)+(2n+2\neq p_x+p_y)\} \Rightarrow p_o-p_1\neq 4$ (9)

If: $p_y \in$ {Level 6}

The same logic leads to: $\{(2n+2\neq p_x+p_y)\}$ Get:$p_o-p_1\neq 6$ (10)

......Recursive derivation →

line: $2\to 4\to 6\to 8\to \ldots\to 2(n-6)\to 2(n-5)\to 2(n-4)\to 2(n-3)\to 2(n-2)$

C_n: (Level 2 (n-2)) also follows the same principle: $p_o-p_1 \neq 2(n-2)$

$\{p_o>p_1$

$p_o-p_1\neq 2$

$p_o-p_1\neq 4$

$p_o-p_1\neq 6$

$p_o-p_1\neq 8$

......

$p_o-p_1\neq 2(n-3)$

$p_o-p_1\neq 2(n-2)\} \Rightarrow p_o-p_1>2(n-2)$

Theorem (ω_3) (QED).

{Comments: Gold Bach's conjecture ball, kick into each branch of Gold Bach's conjecture $\mathbf{C_n}$,

and the ball is not allowed to encounter Gold Bach's conjecture conclusion in each path.

Then we get $p_o-p_1>2(n-2)$.}

3.2.1.4 Theorem (ω_4): $p_o-p_1>2(n-2)$ violates "Bertrand Chebyshev theorem".

Proof:

$(\omega_3) \Rightarrow p_o-p_1>2(n-2) \Rightarrow p_o-p_1>2n-4\geq p_1+p_i-4$. $\{\because 2n\geq p_1+p_i\}$

$\therefore p_o>(2p_1+p_i-4) \therefore p_o\geq(2p_1+p_i-3)$

$\because$ (the smallest prime in κ is 3) $\Rightarrow p_i\geq 3 \therefore (p_o\geq 2p_1+p_i-3) \Rightarrow p_o\geq 2p_1$

$\because$ (odd) ≠ (even) $\therefore p_o>2p_1$

Theorem (ω_1) Get: $p_o>2p_1$ violates the "Bertrand Chebyshev theorem".

(ω_4) (QED).

3.2.1.5 Summary: Causes of contradictions

It is proved that it is wrong to quote "extreme law (2.2)" in this process. It leads to contradictions.

$A_2 \to A_n$ can only be a pseudo stop, There can be no true stop.

As long as one of them does not quote the "extreme law (2.2)", you get:

$p_x+p_y=2(n+1) \Rightarrow p_o+p_y=2(n+1)$ {Theorem(ω_2) : $p_o=p_x$}

(ω_2) $\Rightarrow$ New (*k* line): $3\to 5\to 7\to 11\to 13\to 17\to 19\to\ldots\to p_1\to p_o$

At this time, the complete proof A_n is followed by $p_o+p_y=2(n+1)$

(3. 2) (**QED**).

(3.1) and (3. 2) are equivalent: (3. 2) (**QED**) ⇒ (3. 1) (**QED**).

Conclusion

(3.1) and (3. 2) are equivalent: (3. 2) (**QED**) ⇒ (3.1) (**QED**).

Complete the mathematical complete induction:

{A_1(κ line: 3) (3.1) (**QED**),

A_n(κ line: 3, 5, 7, p_1) (3.1) (**QED**),

A_{n+1}(κ line: 3, 5, 7, $_1$, p_0) (3.1) (**QED**)}.

"Authenticity stop" will not appear, so it is always infinite. ⇒ (3.1) (**QED**).

Statement

-The author has no relevant financial or non-financial interests to disclose.

-The author has no conflict of interest related to the content of this article.

-All authors warrant that they have no relationship with any organization or entity or are involved in any subject or material of financial or non-financial interest discussed herein.

-The author has no economic or proprietary interest in any of the materials discussed herein.

Citation: Ling X (2022) The continuity of prime numbers can lead to even continuity (Relationship with Gold Bach's conjecture). Ann Math Phys 5(2): 171-179. DOI: https://dx.doi.org/10.17352/amp.000062

-Funding (supported by the author).

-Publication consent (consent)

Thanks

Thanks: Preprint of research square (DOI:10.21203/rs.3.rs-713902/v21).

References

1. Background of the study: Euler's version, that is, any even number greater than 2 can be written as the sum of two prime numbers, also known as "strong Gold Bach conjecture" or "Gold Bach conjecture about even numbers". https://www.springer.com/gp/book/9783034808804
2. The theorem of an infinite number of primes: After each prime, you can always find an adjacent prime. January 1978 Fibonacci Quarterly 16.---S P Mohanty https://www.researchgate.net/publication/266044680_THE_NUMBER_OF_PRIMES_IS_INFINITE
3. Erd˝os P. Beweis eines satzes von tschebyschef. Acta Litt. Univ. Sci., Szeged, Sect. Math.,,5:194–198, 1932. Bertrand Chebyshev theorem: if the integer n > 3, then there is at least one prime P, which conforms to n < p < 2n–2. Another slightly weaker argument is: for all integers n greater than 1, there is at least one prime P, which conforms to n < p < 2n.

Citation: Ling X (2022) The continuity of prime numbers can lead to even continuity (Relationship with Gold Bach's conjecture). Ann Math Phys 5(2): 171-179. DOI: https://dx.doi.org/10.17352/amp.000062