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An even Number Divisible by 6 could be Expressed as the Sum of Several Groups of Two Prime Numbers

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Abstract: The XB number axis was moved to the right by two number axis units and overlapped with the XA number axis in the same direction, and the characteristics of the number axis points of twin prime numbers were analyzed. By overlapping XA and XB in opposite directions, it was proved that the number of pairs of P(1,1) prime numbers that could be divisible by 6 was approximately equal to or more than the number of pairs of twin primes that were smaller than the even number.

The analysis of smaller even numbers showed that except 6, other even numbers divisible by 6 could be expressed as the sum of a (6m+1) prime plus a (6m-1) prime (P(1,1) prime pair). And as the even number increased, the number of table method groups increased accordingly, such as 12=5+7, 24=5+19=7+17=11+13, 48=5+43=7+41=11+37=17 +31=19+29. Using the number axis overlapping method to analyze, it was found that the group number of table method was closely related to the group number of twin prime numbers smaller than the even number.

1. Distribution of Twin Primes on Overlapping Number Axes

1.1. Make Twin Prime Numbers Overlapping Number Axis

The positive integers were divided into 6 groups according to the remainder of the division by 6. The prime numbers other than 2 and 3, and the composite numbers not divisible by 2 or 3 were all in A=6m+1 and B=6m-1 odd numbers. Prime numbers were represented by P and composite numbers were represented by H. If A removed HA, the rest was PA, and if B removed HB, the rest was PB (The prime numbers mentioned in this paper did not include 2 and 3, and the composite numbers did not include composite numbers divisible by 2 or 3).

Given an even number N2 (N2=6m, m⩾2), let Pa and Pb be prime numbers smaller than $\sqrt{N_2}$.

Made XA and XB number axes (Figure 1), XA was placed in the first quadrant of the plane Cartesian coordinate system, and XB was placed in the fourth quadrant. The origin was on the Y axis, and the unit length was the same as that of the X axis. XA only displayed A odd number (HA was a circle point, PA was a circle), and XB only displayed B odd numbers (HB was a rhombus, and PB was a diamond box). Connected composite numbers with the same prime factor with an arc, which was shaped like a frequency curve of y=|sinX|. The prime factor was the wavelength root of the frequency curve, and the arc length (wavelength) was 6 times that of the wavelength root. The frequency curve Ep was above XA, Fp was below, and the frequency curve was used a solid line. Gp was above XB, Sp was below, and the frequency curve used a dotted line (dashed line). The wavelength root of Ep and Gp was Pa, and the number of bars was equal to the number of Pa; the wavelength root of Fp and Sp was Pb, and the number of bars was equal to the number of Pb. Passed through the point N2 of the X-axis to make a parallel line Y' with the Y-axis, and each section from 0 to N2 was intercepted, and each frequency curve was also between the Y-axis and the Y' line.

XB vertically moved up and overlapped with XA, and the origin overlapped, so it was a common number axis (ZXAXB) that displayed both A and B. A and B with the same m value on ZXAXB formed a ($\frac{N_2}{6}$-1) group of associated number axis points. If the two odd numbers at the connection point were both prime numbers, it was a set of twin prime numbers with an interval of 2 between them. If both were composite numbers, HA and HB had frequency curves, but there was a distance of two units between HA and HB, and Ep, Fp of HA and Gp, Sp of HB did not intersect on the number axis.

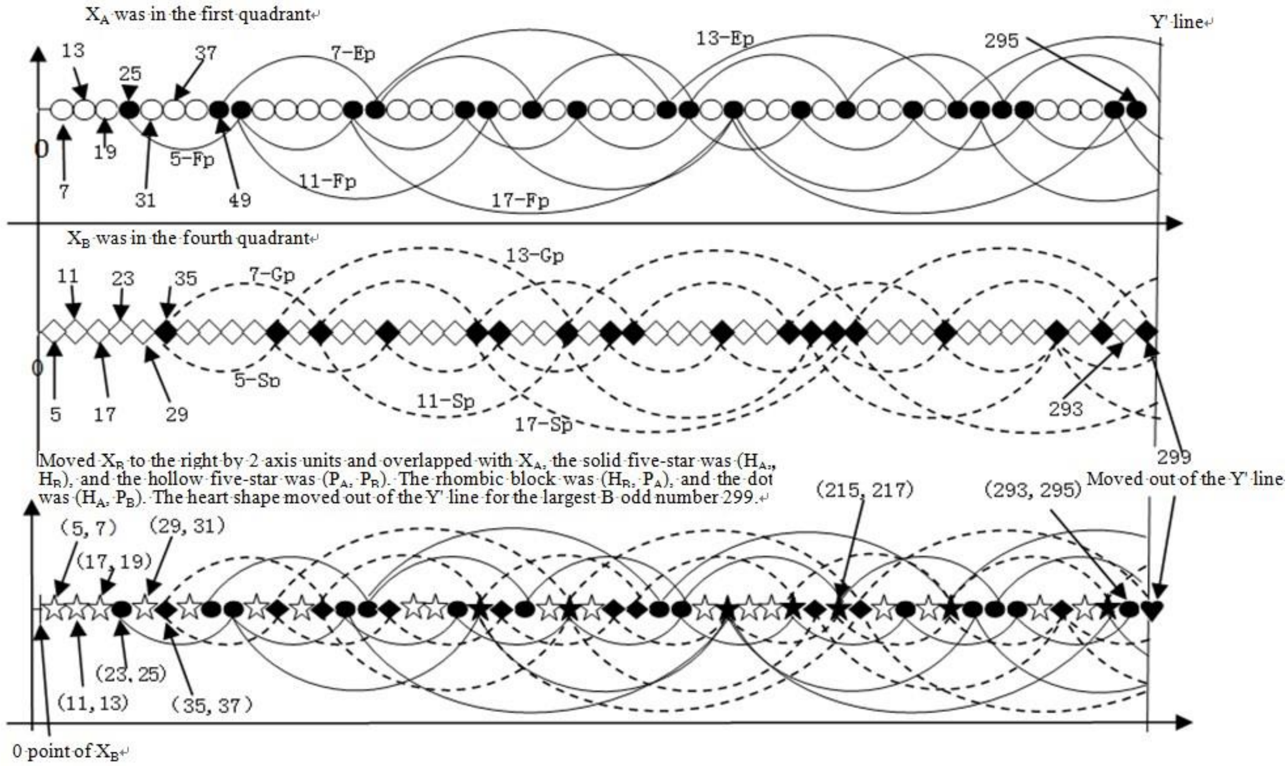


Figure 1: Twin primes overlapping number axis.

XB moved to the right by 2 and then moved up to the overlap with XA, which was called twin prime overlap axis (LXAXB) (Figure 1). The origin of XB overlapped with 2 of XA, and all B odd numbers overlapped with A odd numbers that were 2 larger than it (except for the largest B (N2-1) moved out of the Y axis to the Y' line). If the two composite numbers were overlapped, the overlapping axis points of (HA, HB) had Ep or (and) Fp intersecting with Gp or (and) Sp. The remaining (HA, PB) composed of overlapping HA and PB had only Ep or (and) Fp; the remaining (HB, PA) composed of overlapping HB and PA had only Gp or (and) Sp. The remaining PA and PB overlapping (PA, PB) was a twin prime number without a frequency curve. The group number of (PA, PB) on the LXAXB section from 0 to N2 was the group number of the twin prime number smaller than N2 (excluding the twin primes (3,5)). At present, the law of twin prime numbers has not been found, but the frequency curve is regular, and the intersection of frequency curves is regular. The law of (HA, HB) was found through the intersection law of frequency curves, and the law of (PA, PB) was also found.

Features of LXAXB:

i) Two number axes in the same direction overlapped, one was XA and the other was XB.

ii) The overlapping number axis point was composed of one A and one B, and the difference between the two numbers was 2.

iii) There were ($\frac{N_2}{6}$-1) sets of (A, B) overlapping axis points.

iv) Gp and Sp moved 2 to the right with XB, so that the starting point (abscissa) of Gp was smaller (2Pa-2) than the starting point of Ep with the same frequency, and the starting point of Sp was larger than the starting point of Fp with the same frequency (2Pb+2). Frequency curves of the same wavelength, neither intersected nor overlapped.

v) (PA, PB) gradually became sparser as the number axis lengthened.

1.2. Number of (HA, HB) Groups Where the Frequency Curves Intersected

Different wavelength and frequency curves would intersect with LXAXB to form (HA, HB) with both Ep or (and) Fp and Gp or (and) Sp. The number of groups of (HA, HB) was equal to the quotient obtained by dividing the length of the overlapping axis by 6 times the product of the wavelength root of the relevant frequency curve.

The intersection of Ep\Gp in pairs is referred to the intersection of one Ep and one Gp, regardless of the intersection with other frequency curves. Except that each Ep neither intersected nor overlapped with Gp of the same wavelength, it intersected with other Gp. One or more ep would also intersect with one or more gp at the same overlapping number axis point, and the intersection rule was the same as that of the frequency curve on the same number axis. The intersection of more than two frequency curves occupies more frequency curve axis points. This way, the number of (HA, HB) groups counted according to the intersection of Ep\Gp pairs was reduced, and the number of (HA, HB) groups of Ep\Gp intersections was comprehensively expressed by Σeg.

Two pairs of ep and sp intersected, and one or more ep would also intersect with one or more sp at the same overlapping number axis point. The intersection of more than two frequency curves occupied more number axis points of the frequency curves, and Σes was used to comprehensively represent the number of (HA, HB) groups of Ep\Sp intersections.

Both Fp and Gp intersected, and one or more Fp would also intersect with one or more Gp at the same overlapping axis point, and Σfg was used to comprehensively represent the (HA, HB) the group numbers of Fp\Gp intersecting.

Except that Fp neither intersected nor overlapped with Sp of the same wavelength, it also intersected with other sp. One or more Fp would also intersect with one or more Sp at the same overlapping number axis point, and Σfs was used to comprehensively represent the number of (HA, HB) groups where Fp\Sp intersected.

The two frequency curves and the third frequency curve could also intersect at the same point, and the three frequency curves and the fourth frequency curve could also intersect at the same point. The intersection of multiple frequency curves took up more number axis points of the frequency curves, which reduced the number of (HA, HB) groups counted by the intersection of the two frequency curves. Used ∑efgs to represent reduced number of groups.

Used LHH to represent all (HA, HB) groups: LHH=∑eg+∑es+∑fg+∑fs-∑efgs

1.3. The Number of Groups (Composite Numbers, Prime Numbers) of the Frequency Curve with Only One Number Axis

XA had # HA number of HA points, except forming LHH group (HA, HB) with HB, the remaining HA overlapped with PB to form the (#HA-LHH) group (HA, PB).

XB had a # HB number of HB rhombic blocks, except for forming LHH group (HA,HB) with HA, the remaining HB overlapped with PA to form the (#HB-LHH) group (HB,PA).

1.4. Number of (PA, PB) Groups without Frequency Curve

The remaining prime number axis points overlapped to form the LN2 group of twin prime numbers (PA, PB). The sum of the four overlapping number axis points was equal to the total number of groups of (A, B): LHH+ (#HA-LHH)+(#HB-LHH)+LN2= $\frac{N_2}{6}$ -1

Calculated the number of groups of (PA, PB) by using the remaining relational expression: LN2=($\frac{N_2}{6}$ -1)+LHH-(#HA+#HB)

2. Used XA and XB to Overlap in Opposite Directions, and Analysed the Characteristics of the N2 Overlapping Number Axis

2.1. Made the XA\XB’ Overlapping Number Axis

Flipped the fourth quadrant XB 180°. Point N2 was on the Y axis, the direction was to the left, Gp was still above the number axis, and Sp was still below the number axis, which was called XB’ number axis. The direction of XB’ after flipping was opposite to that of XB, and other properties remained unchanged.

XB' moved up vertically and overlapped with XA, forming the XA\XB' overlapping axis (XAXB) of N2 (Figure 2).

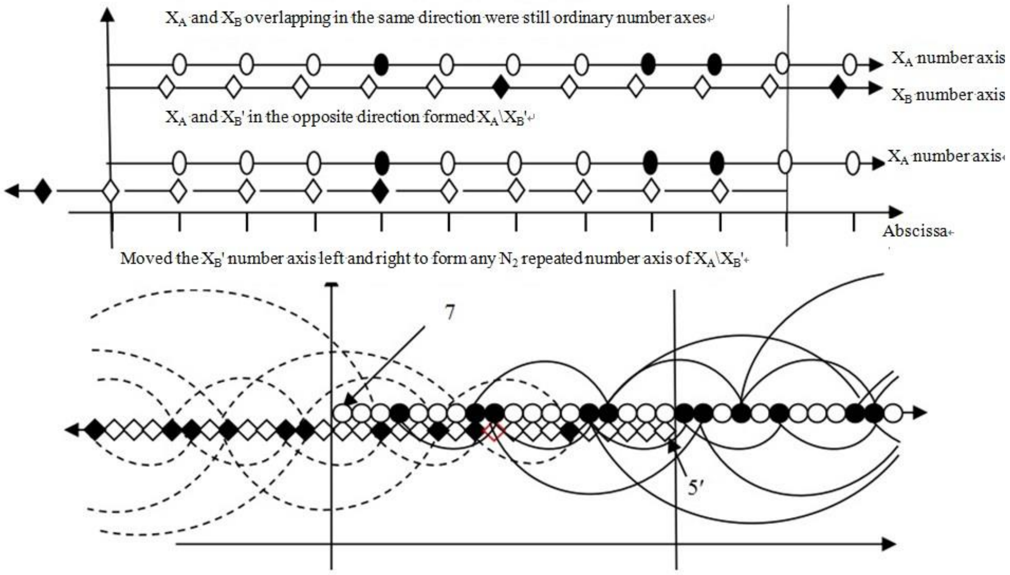


Figure 2: Moved the flipped XB' axis left or right to keep any N2' axis point on the Y axis. After flipping, the XB' number axis overlapped with the XA number axis to form the XA\XB' overlapping number axis of N2

For XAXB, N2' of XB' overlapped with the origin of XA, and all odd numbers of B' overlapped with odd numbers of A (except for the largest B', (N2-1)' overlapped with 1 of XA). Although XB' was in the opposite direction to XB, the frequency curve had no directionality, and the intersecting law of frequency curves had no directionality. If the law of (HA, HB’) was found through the intersection law of the frequency curve, the law of the P(1, 1) prime number pair was also found.

There were two cases of XAXB (Figure 3):

i) If $\frac{N_2}{6P_a}$ and $\frac{N_2}{6P_b}$ were not evenly divisible, then there was no frequency curve overlapping, which was called XAXB1.

ii) If $\frac{N_2}{6P_a}$ or (and) $\frac{N_2}{6P_b}$ could be divided evenly, then the corresponding frequency curves overlapped, which was called XAXB2.

2.2. XAXB1’s Number Axis Point Characteristics and Number of Groups

2.2.1. Features of XAXB1

i) Two number axes with opposite directions overlapped, one was XA and the other was XB’.

ii) The overlapping number axis points were composed of one A and one B', the two numbers were complementary, and their sum was equal to N2.

iii) There were ($\frac{N_2}{6}$-1) sets of (A, B’) overlapping axis points.

iv) Frequency curves of the same wavelength neither intersected nor overlapped.

v) (PA, PB’) was relatively evenly distributed on XAXB1.

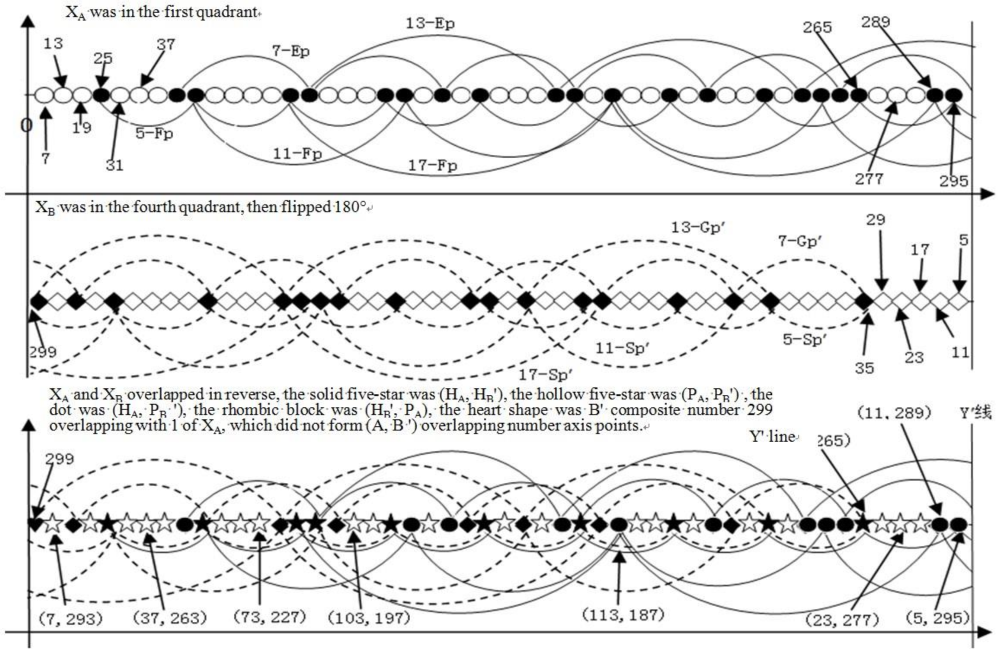


Figure 3: XA\XB' overlapping axis (N2=300), 5-Fp, and 5-Sp overlapped.

2.2.2. Number of (HA, HB') Groups Where the Frequency Curves Intersected

The frequency curves of the two axes with different wavelengths would intersect on XAXB1 to form (HA, HB') which had both Ep or (and) Fp, and Gp' or (and) Sp'.

The intersection of Ep\Gp' was the same as the intersection of Ep\Gp in LXAXB. Except that Ep neither intersected nor overlapped with Gp' at the same wavelength, it also intersected with other Gp', and one or more Ep also intersected with one or more Gp' at the same overlap axis point. The intersection of more than two frequency curves occupied more number axial points of frequency curves, which reduced the number of (HA, HB') groups counted by Ep\Gp' pairwise intersection. Used $\sum$eg' to comprehensively express the number of (HA, HB') groups where Ep\Gp' intersected.

The intersection of Ep\Sp' was the same as the intersection of Ep\Sp with LXAXB. Two pairs of ep and Sp' intersected, and one or more Ep would also intersect with one or more Sp' at the same overlapping number axis point. Used $\sum$es' to comprehensively represent the number of (HA, HB') groups where Ep\Sp' intersected.

The intersection of Fp\Gp'was the same as the intersection of Fp\Gp of LXAXB. Fp and Gp' intersected in pairs, and one or more Fp would also intersect with one or more Gp' at the same overlap axis point. Used $\sum$fg' to comprehensively represent the number of (HA, HB') groups where Fp\Gp' intersected.

The intersection of Fp\Sp' was the same as the intersection of Fp\Sp of LXAXB. Except that Fp neither intersected nor overlapped with Sp' at the same wavelength, it also intersected with other Sp', and one or more Fp would also intersect with one or more Sp' at the same overlap axis point. Used $\sum$fs' to comprehensively represent the number of (HA, HB') groups where Fp\Sp' intersected.

The two frequency curves and the third frequency curve could also intersect at the same point, and the three frequency curves could also intersect the fourth frequency curve at the same point, which was the same as the intersecting of multiple frequency curves of LXAXB. The intersection of multiple frequency curves took up more number axis points of the frequency curves, which reduced the number of (HA, HB’) groups counted by the intersection of the two frequency curves. Used $\sum$ efg’s’ to represent these reduced group numbers.

Used N2HH to express the group number of all (HA, HB’): N2HH=$\sum$eg’+$\sum$es’+$\sum$fg’+$\sum$fs’-$\sum$efg’s’

2.2.3. The Number of Groups (Composite Numbers, Prime Numbers) of the Frequency Curve with Only One Number Axis

XA had # HA number of HA points, except for forming the N2HH group (HA, HB') with HB', the remaining HA overlapped with PB' to form the (#HA-N2HH) group. This group only had (HA, PB ') of Ep or (and) Fp.

XB' had # HB number of HB' rhombic blocks, except for forming N2HH group (HA, HB') with HA, the remaining HB' overlapped with PA to form the (#HB-N2HH) group. This group only had (HB', PA) of Gp or (and) Sp.

2.2.4. Number of (PA, PB’) Groups without Frequency Curve

The remaining prime number axis points overlapped with form (PA, PB') of the DN2 group of frequency-free curves, which was the P (1, 1) prime number pair of N2. The sum of the four overlapping number axis points was equal to the total number of groups of (A, B'): N2HH+(#HA-N2HH)+(#HB-N2HH)+DN2= $\frac{N_2}{6}$ -1

Calculated the number of groups of (PA, PB’) by using the remaining relational expression: DN2=($\frac{N_2}{6}$ -1)+N2HH-(#HA+#HB)

2.2.5. Similarities and Differences between XAXB1 and LXAXB

2.2.5.1. Similarities

i) Both were overlaps of XA and XB. XA was the same, and XB' was only in the opposite direction to XB, and other properties remained unchanged.

ii) There were ($\frac{N_2}{6}$ -1) sets of (A,B) overlapping axis points.

iii) The two odd numbers at overlapping number line points were both one A and one B.

iv) Had exactly the same frequency curve.

v) Frequency curves of the same wavelength neither intersected nor overlapped.

vi) The intersecting law of the frequency curves was the same.

vii) The calculation methods of N2HH and LHH were the same, and the formulas were the same.

viii) The remaining relation for XAXB1 was the same as for LXAXB.

2.2.5.2. Differences

i) The directions of the two number axes of XAXB1 were opposite, and the directions of the two number axes of LXAXB were the same.

ii) The two numbers of overlapping number axis points of XAXB1 were complementary, and their sum was equal to N2; the difference of two numbers of overlapping number axis points of LXAXB was 2.

iii) (PA, PB’) was relatively evenly distributed on XAXB1; (PA, PB) was dense first and then sparse on LXAXB.

2.2.6. Deviation Analysis

According to the comparison between randomly selected XAXB1 and LXAXB of equal length, the number of P(1, 1) prime number pairs of XAXB1 was slightly less than the number of twin prime numbers of LXAXB.

From the remaining relational expression, #HA and #HB were only related to the size of N2, and (PA, PB’) would decrease only when (HA, HB’) decreased.

2.2.6.1. Intersection of Non-Composite Dotted Lines of Frequency Curves

Ep extended leftwards to the Y axis with a dotted line, and had a dotted line intersection with XA, which was the non-composite dotted line intersection of the frequency curve, which was a prime number of the wavelength root itself, and the non-composite dotted line intersection of Ep was at the left end. Fp extended left to the Y axis with a dotted line, and there was no dotted line intersection with XA. Gp extended to the left with a dotted line to the Y axis and there was no dotted line intersection. sp extended to the left with a dotted line, there was a dotted line intersection, and the non-composite dotted line intersection of sp was also at the left end.

XB turned 180 ° to become XB', and the dotted line intersection point of Sp' moved to the right end.

2.2.6.2. The Influence of Non-Composite Dotted Line Intersections on (HA, HB’)

The number axis segment from 0 to the intersection point of the non-composite dotted line was the no composite segment (NOH) of the frequency curve. Removed (NOH), and the remaining number axis segment was the segment where this frequency curve intersected with other frequency curves. The length of the intersection area was divided by 6 times the root product of the wavelength of the correlation frequency curve to obtain the exact group number of (HA, HB').

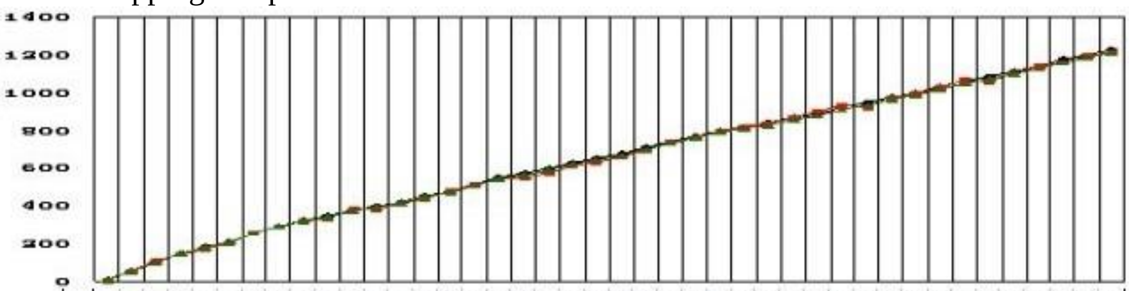
The (NOH) of both EP and SP on LXAXB was on the left end. Intersection of Ep\Sp: the two (NOH) overlapped, and only the (NOH) with larger wavelength was removed in the intersection area.

The (NOH) of EP and the (NOH) of Sp’ to XAXB1 were located at two ends. The intersection of Ep\Sp': removed (NOH) of Ep at the left end, and remove (NOH) of Sp' at the right end. Compared with the Ep\Sp intersection of LXAXB, the smaller wavelength (NOH) was removed, making the intersection area slightly shorter, and it was possible to reduce a group of (HA, HB’). The larger the even number, the more frequency curves, the more intersections of Ep\Sp', and the more opportunities to reduce one group (HA, HB') compared with the intersection of the corresponding frequency curves of LXAXB. But the reduced number of groups accounted for a very small proportion of the whole N2HH. According to the statistics of the area of the curved trapezoid formed by all groups where Ep\Sp’ intersected, the curved trapezoid was composed of (#Pa)*(#Pb) vertical lines representing the intersection of Ep\Sp’. Each vertical line consisted of points representing (HA, HB’). The denominator of the N2HH proportion of the reduced number of groups was the area of the curved trapezoid. The numerator was half of the length of the curved side (according to the calculation that the uppermost group (HA, HB') of each vertical line was equal or one group less was half), so the reduction ratio of (HA, HB') was very small.

2.2.6.3. The Influence of the Intersection Origin on (HA, HB’)

The intersection of EP\Gp’ had only one (NOH) of Ep, the intersection of Fp\Gp’ had no (NOH), both were the same as the intersection of LXAXB. The intersection of Fp\Sp’ also had a (NOH) of Sp’, which was the same as the intersection of Fp\Sp of LXAXB, except that the (NOH) of Fp\Sp was at the left end and the (NOH) of Fp\Sp’ was at the right end. There were also group differences in the number of overlaps between these three intersections and the LXAXB intersection.

The intersection starting point of the two frequency curves on LXAXB was fixed, such as the intersection starting point (abscissa) 301 of 7-Ep\13-Gp, and the intersection starting point 247 of 13-Ep\7-Gp. And the intersection starting point of XAXB1 was related to N2. When N2 was equal to 1002, 10002, 100002, the intersection starting points of 7-Ep\13-Gp’ were 469, 343, 175, and the intersection starting points of 13-Ep\7-Gp’ were 169, 559, 91. A smaller intersection start point than LXAXB was equal to a slightly longer intersection area. If the intersection starting point was larger than that of LXAXB, it meant that the intersection area was slightly shorter, and it was possible to make (HA, HB’) one group less or one group more than (HA, HB) of LXAXB. However, when many frequency curves intersected in pairs or multiple frequency curves intersected, the differences caused by different starting points canceled each other out, which had an impact on the number of groups of overlapping composite numbers but not much.



N_2	D/L_x%	D	L_x
66	100.0000	6	6
1686	107.6923	56	52
3966	104.9019	107	102
6294	97.9452	143	146
8538	93.3701	169	181
10182	95.2153	199	209
13782	100.0000	255	255
16314	100.0000	288	288
18276	98.4375	315	320
20316	95.6395	329	344
22212	102.4000	384	375
23658	96.2121	381	396
25812	98.5576	410	416
28206	97.5446	437	448
30726	99.7890	473	474
33084	99.4117	507	510
35874	97.8102	536	548
38034	95.7894	546	570
40566	96.4705	574	595
43002	97.7491	608	622
45522	97.0724	630	649
48012	97.7744	659	674
50514	97.6022	692	709
53226	99.3224	733	738
56016	99.2156	759	765
58518	99.8743	795	796
60834	99.8776	816	817
63234	99.8803	835	836
65808	100.3472	867	864
68022	101.8120	899	883
70998	101.3057	931	919
73638	97.5661	922	945
76512	99.7942	970	972
79008	99.6984	992	995
81828	99.8054	1026	1028
84342	100.4734	1061	1056
87012	97.5992	1057	1083
89538	99.1884	1100	1109
92244	99.9120	1136	1137
95094	98.8064	1159	1173
97602	99.7491	1193	1196
100008	98.8552	1209	1223

Figure 4: Example of D/L (%) ratio of even numbers without prime factors (the distance between two numbers was about 2000, and the lines overlapped).

Affected by these factors, XAXB1 had slightly less overlap than LXAXB, making (PA, PB’) less, but the proportion of less was very small. According to the comparison between randomly selected slightly longer XAXB1 and LXAXB of equal length, the number of P(1,1) prime number pairs of XAXB1 was about 1.2% less than the number of twin prime numbers of LXAXB on average, less than 5%. Statistically, there was no significant difference (Figure 4).

Therefore, the number of P(1,1) prime number pairs of XAXB1 was approximately equal to the number of twin prime numbers of LXAXB: DN2≈LN2

2.3. XAXB2's Number Axis Point Characteristics and Number of Groups

For LXAXB and XAXB1, the frequency curves with the same wavelength neither intersected nor overlapped, but did intersect with other frequency curves. The non-intersecting number axis points overlap with the prime numbers of another number axis to form (HA, PB’) and (HB’,PA).

On XAXB2, if $\frac{N_2}{6P_a}$ could be divisible, then Ep with Pa as the wavelength root completely overlapped with Gp’ with the same wavelength (Figure 3). Composite number line points all formed (HA, HB’), which reduced the overlap with another number line prime and increased (PA, PB’). The increased number of groups was approximately equal to (LN2*0.988*(1+3/pa)/pa), and every (Pa-1) N2, there was an N2 that could be divisible by (6Pa), and (PA, PB’) increased.

Similarly, if $\frac{N_2}{6P_b}$ could be divisible, then the Fp with Pb as the root of the wavelength completely overlapped with the same wavelength of Sp’, which reduced the overlap with prime numbers on another number axis and increased (PA, PB’). And every (Pb-1) N2, there was one N2 that could be divisible by (6Pb), and (PA, PB’) increased. These prime numbers that could make $\frac{N_2}{6P_a}$ or $\frac{N_2}{6P_b}$ divisible and increase (PA, PB’) were called the prime factors of the even number (Table 1).

Table 1. Effect of prime factor 5 on the D/L ratio of N2 even numbers

N2	L	D	D/L(%)	Prime factor
10020	205	263	128.2926	5
10110	208	254	122.1153	5
10170	209	271	129.6650	5
10380	212	269	126.8867	5
10410	212	279	131.6037	5
100020	1223	1602	130.9893	5
100140	1223	1595	130.4170	5
100260	1224	1623	132.5980	5
100290	1224	1658	135.4575	5
100410	1226	1635	133.3605	5
1000170	8169	10765	131.7786	5
1000200	8169	10669	130.6035	5
1000260	8170	10852	132.8274	5
1000290	8170	10792	132.0930	5
1000380	8171	10801	132.1870	5
10000020	58979	77536	131.4637	5
10000110	58979	77749	131.8248	5
10000140	58979	77592	131.5586	5
10000230	58980	77334	131.1190	5
10000260	58980	77634	131.6276	5

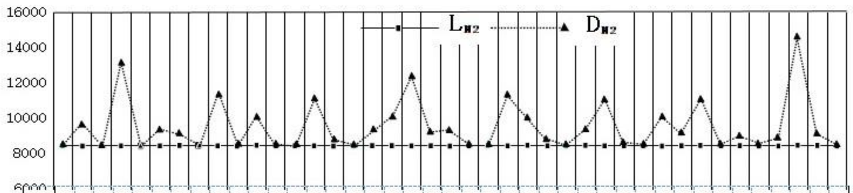
If there were multiple Pa that could make $\frac{N_2}{6P_a}$ divisible, or multiple Pb that could make $\frac{N_2}{6P_b}$ divisible, or both Pa that could make $\frac{N_2}{6P_a}$ divisible and Pb that could make $\frac{N_2}{6P_b}$ divisible, then (PA, PB’) was affected by the combined effects of these prime factors [Note].

The prime factor increased (PA, PB’) with XAXB2 inversely proportional to the size of the prime factor. The smaller the prime factor, the more (PA, PB’) was increased; It was also related to the number of prime factors, the more prime factors, the more (PA, PB’) would be increased (Figure 5).

Therefore, the number of (PA, PB’) groups of XAXB was approximately equal to or more than the number of (PA, PB) groups of LXAXB: DN2⩾LN2

2.4. P (1,1) Prime Number Pairs With Infinite N2

Both PA and PB were infinite. The numbers of PA and PB between 0 and an even number were basically equal [1-2]. The increase of N2 to 2N2 would not cause PA and PB in the number axis segment from 0 to N2, but the corresponding overlapping number axis segment from N2 to 2N2 would not have PA and PB. The intersection law of the frequency curve would not change, so the doubling of N2 still followed the law of DN2⩾LN2. N2 was infinitely doubled, and these [3-4] properties would not change. Although it was not yet certain that the number of twin prime arrays was infinite, the known twin prime numbers would not disappear. The number of P(1,1) prime number pairs with infinite N2 must be more than the number of known twin prime numbers.



N_2	D_{N2}	L_{N2}	Prime factor
1000002	8200	8168	
1000008	9380	8168	17, 19, 43
1000014	8133	8168	
1000020	12984	8168	5, 7
1000026	8120	8168	
1000032	9035	8168	11, 947
1000038	8869	8168	13
1000044	8100	8169	
1000050	11095	8169	5, 59, 113
1000056	8113	8169	
1000062	9717	8169	7
1000068	8095	8169	
1000074	8075	8169	
1000080	10811	8169	5, 463
1000086	8431	8169	23
1000092	8045	8169	
1000098	8979	8169	11
1000104	9752	8169	7
1000110	12072	8169	5, 17, 37, 53
1000116	8845	8169	13
1000122	8963	8169	19, 31, 283
1000128	8096	8169	
1000134	8127	8169	
1000140	11031	8169	5, 79, 211
1000146	9634	8169	7
1000152	8450	8169	29, 479
1000158	8078	8169	
1000164	8991	8169	11
1000170	10765	8169	5
1000176	8317	8169	67, 311
1000182	8153	8169	89
1000188	9728	8169	7
1000194	8815	8169	13
1000200	10669	8169	5
1000206	8170	8169	181, 307
1000212	8640	8169	17
1000218	8101	8170	
1000224	8549	8170	23, 151
1000230	14394	8170	5, 7, 11, 433
1000236	8779	8170	19, 41, 107
1000242	8133	8170	

Figure 5: Effect of prime factors on DN2.

2.5. P (1, 1) Prime Number Pairs Adjacent to N2

In the planar Cartesian coordinate system, connect the points with N2 as the abscissa and LN2 as the vertical coordinate of the group number of twin prime numbers smaller than N2 to form a parabola (LN2 curve). Then connect the points on N2 as the abscissa and the P(1,1) prime number pair group number DN2 of N2 as the vertical coordinate (DN2 connecting line). Due to the influence of the prime factor, the DN2 of adjacent N2 can be greatly different, and the standard curve cannot be formed. The upper part of the connecting line is uneven, forming an irregular thorn shape, which is shaped like a crocodile tail. The shape of the curve as the even numbers increases is like a hand-drawn porcupine back [5-6]. Even the lowest points (points with (PA, PB’) group the number of XAXB1 as the vertical coordinate) form a smooth curve. It basically coincides with the LN2 curve. No matter how the connection fluctuates, it will not break through the LN2 curve downward. The general trend of the connection increases with the increase of N2 (Figure 5) [7].

3. Conclusion

Even number 6 can be expressed as the sum of 3+3. Other even numbers divisible by 6 can be expressed as the sum of PA plus PB. The number of representation groups is approximately equal to or more than the number of groups of twin prime numbers smaller than the even number.

[Note]: If N has prime factors p1, p2, p3,…., the number of twin prime arrays smaller than N is LN, and R is the remainder of N/6. Let $k \approx LN*((1+|3-R|)/4)*0.988$ (rounded). The number of pairs of P(1,1) prime numbers with increased prime factors is approximately: (k*(1+3/p1)/p1) (rounded)+(k*(1+3/p2)/p2) (rounded)+(k*(1+3/p3)/p3) (rounded)+……) +(2*k/(p1*p2))(rounded)+(2*k/(p1*p3)) (rounded)+(2*k/(p2*p3))(rounded) +……). This formula is applicable to each even number of N1, N2, and N3, which will be explained in another article.

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Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

References

[1] Xiao Yichun. The classification of prime numbers. Digitization User. 2022(5):140

[2] Gao Hongwei. A Reference Manual for the Study and Application of Prime Numbers. Science Press. 2008

[3] Lv, Z., Qiao, L., & Lv, H. (2022). Cognitive Computing for Brain–Computer Interface-Based Computational Social Digital Twins Systems. IEEE Transactions on Computational Social Systems.

[4] C. Zhang, X. Liu and D. Biś, An Analysis on the Learning Rules of the Skip-Gram Model. 2019 International Joint Conference on Neural Networks (IJCNN), 2019, pp. 1-8, doi: 10.1109/IJCNN.2019.8852182.

[5] Kishita Naoko. Distributed System Access Control for Fuzzy Mathematics and Probability Theory. Distributed Processing System (2022), Vol. 3, Issue 3: 72-81. https://doi.org/10.38007/DPS.2022.030309.

[6] Xl A , Hao L A , Ww A , et al. Big data analysis of the internet of things in the digital twins of smart city based on deep learning. 2021., 128:167-177.

[7] Lv, Z., Xie, S., Li, Y., Hossain, M. S., & El Saddik, A. (2022). Building the Metaverse by Digital Twins at All Scales, State, Relation. Virtual Reality & Intelligent Hardware, 4(6), 459-470.