Complex number three-dimensional coordinates system and Riemann's Conjecture

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Abstract—In XOY plane rectangular coordinate system, the imaginary number axis Im perpendicular to O point is established. This is an complex number three-dimensional coordinate system. In this system, the nontrivial zeros of a Riemannian function are arbitrarily given. Based on Euler product formula, the non-trivial zeros of Riemann Zeta function in three-dimensional coordinate system are analyzed and calculated. The facts proved Riemann's conjecture.
Key words: Complex number three-dimensional coordinates system ; Real number plane coordinates system ; Euler product formula; Riemann Zeta function
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1. Introduction

Euler product formula:

$$\sum_n \frac{1}{n^z} = \prod_p \frac{1}{1-p^{-z}}$$

Riemann zeta function:

$$\zeta(z) = \sum_n \frac{1}{n^z} = 0$$

In $\zeta(z) = \sum_n \frac{1}{n^z} = \prod_p \frac{1}{1-p^{-z}}$, have: $\prod_p \frac{1}{1-p^{-z}} = \prod_p \frac{p^z}{p^z-1}$, set $\prod_p \frac{p^z}{p^z-1} = 0$, Then there is, $\zeta(z) = \prod_p \frac{p^z}{p^z-1} = 0$, (P is the set of all primes), when $p^z = 0$, $\zeta(z) = 0$

So Z must be a complex number, set $z = a + bi$, $\zeta(z) = 0$ is the nontrivial zero of Riemann function, Riemann's Conjecture $\zeta(z) = 0$ They are all distributed on a straight line of a=1/2.

2. preparation work

Complex number three-dimensional coordinates system ,fig1:

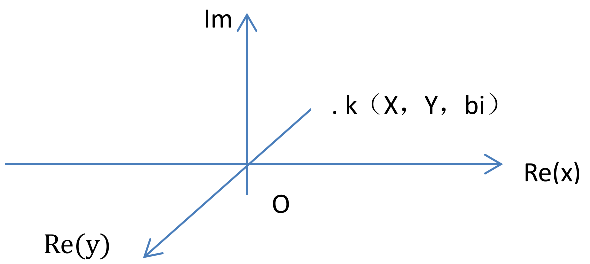

fig1

In fig, Re(x) and Re(y) form a real number plane $\{Re(x)\ O\ Re(y)\}$, the imaginary number axis Im perpendicular to O point is establish, This is complex number three-dimensional coordinates system，Points on the {Re(x) O Re(y)} are marked as（X，y）. If a point K is given arbitrarily in space, it is marked K.（X，y，bi）. Then on the Im axis, let's give a point at which we can make another real number plane perpendicular to the Im axis, $\{\mathrm{Re(x)}\ O'\ \mathrm{Re(y)}\}$ Fig2

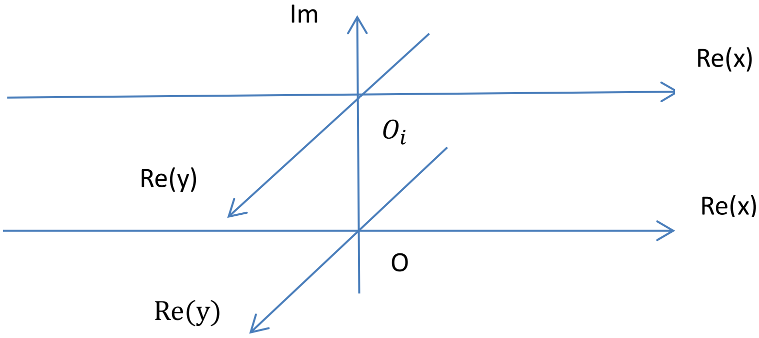

Fig2

Obviously, there are infinite real number planes in complex number three-dimensional coordinates system

3. Proof of proposition

Proof：Set $p_j = \prod_{u=1}^{k} p_{ju}$， $p_{ju} = \{p_{j1}, p_{j2},\ldots p_{jk}\} \in p$， $(\mathrm{u} = 1,2,3 \ldots \mathrm{k})$， that p_j^z，

$\mathrm{z = a + bi}$， $p_j^z = p_j^{a+bi} = p_j^a p_j^{bi}$， $\because e^{(bi)\ln p_j} = p_j^{bi}$ $\therefore p_j^{a+bi} = p_j^a e^{(b\ \ln p_j)i}$，

When $p_j^z = 0$， $\prod_p \frac{p^z}{p^z-1} = 0$， $\because p_j^a \neq 0$， $\therefore \exists!\, e^{(b\ln p_j)i} = 0$ makes $p_j^z = 0$.

$\because e^{\theta i} = \cos\theta + \mathrm{i}\sin\theta$, set $\cos\theta + \mathrm{i}\sin\theta = 0$， have $\mathrm{i}\sin\theta = -\cos\theta$，

when$\theta = {}^{\pi}/_{4}$， Fig3 $\mathrm{i}\sin\theta = \mathrm{i} \times \frac{\sqrt{2}i}{2} = -\frac{\sqrt{2}}{2} = -\cos\theta$

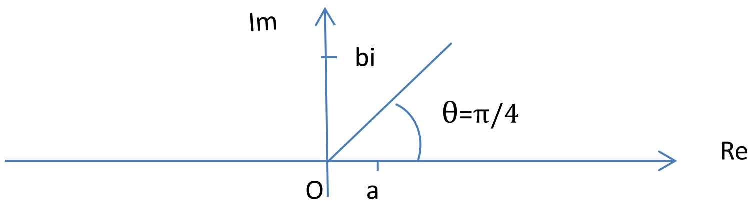

Fig3

$\because \theta = {}^{\pi}/_{4}$， $\therefore$ when $\theta\mathrm{i} = {}^{\pi i}/_{4}$， have **lemma 1**

To $p_j^z = 0$, it must be satisfied $e^{(b\ln p_j)i} = e^{\theta i} = 0$， that the angle between $\mathrm{z = a + bi}$ and Re is $\theta = {}^{\pi}/_{4}$.

If $p_j^z = 0$， must $\mathrm{a} = {}^{1}/_{2}$.

Proof： Fig4 In complex number three-dimensional coordinates system,

∀K, K（Re(x), Re(y), bi）, k ∋ $\zeta(\mathrm{z}) = 0$ ，

1) $\overline{KO}$ connects K and Im, Based on **lemma 1** The angle between $\overline{KO}$ and $\{\mathrm{Re(x)\ O\ Re(y)}\}$ is ${}^{\pi}/_{4}$. $\because$ $\cos {}^{\pi}/_{4} = {}^{b}/_{\overline{KO}}$, $\therefore$ $\overline{KO} = \sqrt{2}b$, is vector.

2) Point O is perpendicular to Im, making a real number plane $\{\mathrm{Re(x)\ O\ Re(y)}\}$,

3) Set $\overline{Kbi}$ $\perp$Im.

4) Set $\overline{KR}$ $\perp \{\mathrm{Re(x)\ O\ Re(Y)}\}$,

5) Because the projection of K on Re is a.

$\therefore \overline{Ra} \perp \mathrm{Re(x)}$, $\overline{Ra'} \perp \mathrm{Re(y)}$, $\therefore \overline{RO}$ makes $\angle$ $\mathrm{Roa} = \angle$ $\mathrm{Ro}a' = {}^{\pi}/_{4}$.

$\because \overrightarrow{ko}$ is vector, So the way to build $1) \to 5)$ is $\exists!$. If K exists in $\{\mathrm{Re(x)\ O\ Re(Y)}\}$, that K is $\exists!$ in $\{\mathrm{Re(x)\ O\ Re(Y)}\}$.

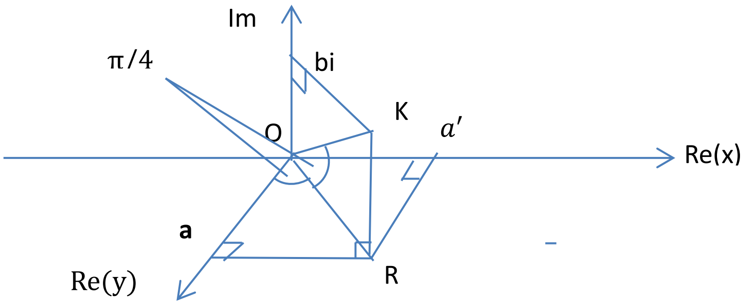

Fig4

That $\forall K', K' \neq K, K' \ni \zeta(z) = 0, \therefore K'(\mathrm{X},\ \mathrm{y},\ b'i)$, $bi \neq b'i$, So , $b'i$ is variable.

Proof: See $e^{(bi)\ln p_j}$, $\because$ $p_j = \prod_{u=1}^{k} p_{ju}$, $p_{ju} = \{p_{j1}, p_{j2}, \ldots p_{jk}\} \in p$ is dependent variable,(when p_{ju} has different combinations) set ($b \ln p_j$)= $\delta + \mathrm{b} = b'$, that is

$e^{(bi)\ \ln p_j} = e^{(\delta+\mathrm{b})\mathrm{i}} = e^{\delta i} e^{bi}$, set $e^{\delta i} = 1$, has $bi \neq b'i$ #

Therefore, all K is distributed on the extension line of $\overline{KR}$. And the projection of R on Re is a. so all nontrivial zero is distributed on the line of $\mathrm{Re} = \mathrm{a}$.

$\because \cos\theta = {}^{a}/_{b} = {}^{\sqrt{2}}/_{2}$, $\therefore \mathrm{b} = {}^{2a}/_{\sqrt{2}}$, $\because \overline{Ra} = a, \therefore b^2 = a^2 + a^2$, $\therefore \mathrm{b} = \sqrt{2}a$, that is

$$\begin{cases} \mathrm{b} = \sqrt{2}a \\ b = {}^{2a}/_{\sqrt{2}} \end{cases} \to \sqrt{2}a = {}^{2a}/_{\sqrt{2}} \quad \exists!\ \mathrm{a} = {}^{1}/_{2}\text{, have } {}^{\sqrt{2}}/_{2} = {}^{\sqrt{2}}/_{2}$$

$\therefore \exists!\ \mathrm{a} = {}^{1}/_{2}$ Satisfy the equation .So Riemann's Conjecture is right.

REFERENCES

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