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159 – 162

One opinion about the Riemannian Hypothesis

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Abstract. *In the present work is an attempt for a new application of the trigonometric form of complex numbers and functions of complex variables.*

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Our interestsare multiples zerosin a complex plane.

Let's look at Euler's formula

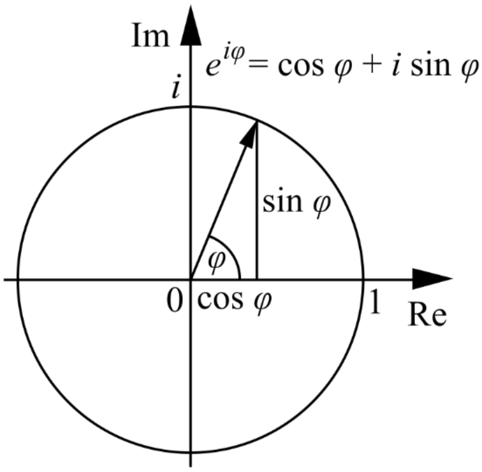

Fig.1

This figure is taken from the Internet (“Exponential function”)

Hence if

$$z = x + iy$$

Is any complex variable, then we have

$$|z| = \sqrt{x^2 + y^2}\ ,\ \cos\varphi = \frac{x}{x^2 + y^2};\sin\varphi = \frac{y}{x^2 + y^2}$$

Where

$$z = |z|(\cos\varphi + i\sin\varphi). \Leftrightarrow$$

$$\Leftrightarrow\ z = |z|e^{i\varphi}$$

This is trigonometric recording of complex variable $z = x + iy$.

Geometrically using Euler's formula the equation $z = |z|e^{i\varphi}\ 0 \le \varphi < 2\pi$ ***is an equation of a circle with center at the beginning of the coordinate system and radius*** $|z|$**.**

Theorem (Riemann hypothesis)

Let us now write the **Riemann zeta function.**

$$\varsigma(s)=\sum_{1}^{\infty}\frac{1}{n^{s}}=1+\frac{1}{2^{s}}+\frac{1}{3^{s}}+\frac{1}{4^{s}}\ldots+\frac{1}{n^{s}}+\ldots,$$

Where in honor of Riemann $s=\sigma+i\tau$

Then we say that the complex variable $s=\sigma+i\tau$ with a positive real part for which the Riemann zeta function $\varsigma(s)=0$ is the real part equal to ½.I.e. ($\sigma=\frac{1}{2}$)

Proof.

Let $s=\sigma+i\tau$ be a solution of equation $\varsigma(s)=0$ .For greater convenience we will introduce:

$$z_1=1, z_2=\frac{1}{2^s}, z_3=\frac{1}{3^s},\ldots, z_n=\frac{1}{n^s},\ldots$$

In the beginning we will record in trigonometric form $z_1, z_2, z_3,\ldots, z_n,\ldots$. Namely

$$z_n=n^{-s}=e^{l_n n^{-s}}=e^{l_n n^{-\sigma-i\tau}}=e^{(-\sigma-i\tau)l_n n}=e^{-\sigma l_n n-i\tau l_n n}=e^{l_n n^{-\sigma}}e^{-il_n n}=n^{-\sigma}e^{il_n n^{-\tau}}\quad \text{I.e.}$$

$$z_n=n^{\sigma}e^{il_n n^{-\tau}}\ \text{Or}\ z_n=\left|n^{-\sigma}\right|\left(\cos\left(l_n n^{-\tau}\right)+i\sin\left(l_n n^{-\tau}\right)\right)\ldots\text{I.e.}$$

$$z_1=\left|1^{-\sigma}\right|\left(\cos\left(l_n 1^{-\tau}\right)+i\sin\left(l_n 1^{-\tau}\right)\right)$$

$$z_2=\left|2^{-\sigma}\right|\left(\cos\left(l_n 2^{-\tau}\right)+i\sin\left(l_n 2^{-\tau}\right)\right),$$

$$z_3=\left|3^{-\sigma}\right|\left(\cos\left(l_n 3^{-\tau}\right)+i\sin\left(l_n 3^{-\tau}\right)\right)\ldots,$$

$$\ldots$$

$$z_n=\left|n^{-\sigma}\right|\left(\cos\left(l_n n^{-\tau}\right)+i\sin\left(l_n n^{-\tau}\right)\right)\text{or}$$

$$\ldots$$

$$z_1=\left|1^{-\sigma}\right|e^{il_n 1^{-\tau}}$$

$$z_2=\left|2^{-\sigma}\right|e^{il_n 2^{-\tau}}$$

$$z_3=\left|3^{-\sigma}\right|e^{il_n 3^{-\tau}}$$

$$\ldots$$

$$z_n=\left|n^{-\sigma}\right|e^{il_n n^{-\tau}}$$

$$\ldots$$

ISSN: 2321-8169
159 – 162

We complement all each equations to equations of circles as follows indications:

$$z_1 = \left|1^{-\sigma}\right| e^{i\theta_1} \ldots 0 \le \theta_1 < 2\pi$$

$$z_2 = \left|2^{-\sigma}\right| e^{i\theta_2} \ldots 0 \le \theta_2 < 2\pi$$

$$z_3 = \left|3^{-\sigma}\right| e^{i\theta_3} \ldots 0 \le \theta_3 < 2\pi$$

$$\ldots$$

$$z_n = \left|n^{-\sigma}\right| e^{i\theta_1} \ldots 0 \le \theta_n < 2\pi$$

$$\ldots$$

I.e. *"We include our problem in a more general problem"*

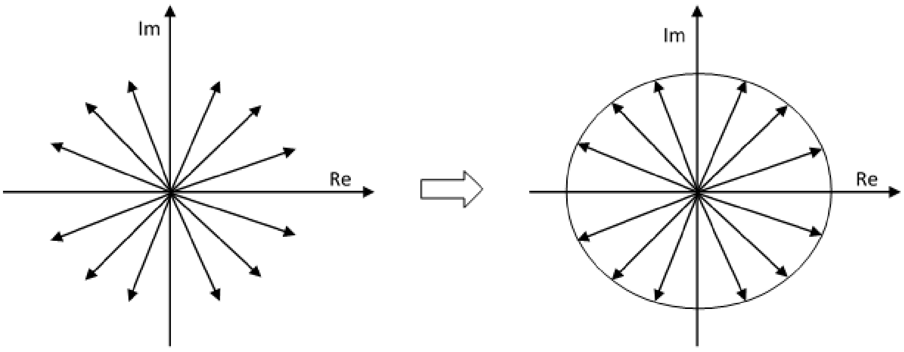

Fig.2

This is a well-known method.For example in "Theory of extremely tasks", that is one of fundamental methods.Now all theselasts equations are equations of circleswithrespective radii: $\left|1^{-\sigma}\right|, \left|2^{-\sigma}\right|, \left|3^{-\sigma}\right|, \ldots, \left|n^{-\sigma}\right|, \ldots$ and with total center in the beginning of coordinate system (O,Re,Im).

$$l_n n^{-\tau} \in \theta_n \quad n = 1,2,3,\ldots 0 \le \theta_n < 2\pi$$

For every ***n*** $l_n n^{-\tau}$ is only one ofpossible values of θ_n .Obviously all decisions made by the task Inclusion are decisions and to the Riemann hypothesis.The **Riemannian Hypothesis**is one partial (special) possible case about this new problem.

A more detailed: $\rho_n = \left|n^{-\sigma}\right| = \sqrt{n^{-2\sigma}} = \frac{1}{\sqrt{n^{2\sigma}}}$

For every ***n*** ρ_n is radius of circle.Or for each particular value of ***n***, the radius is constant, but for different ***n***respective radii are different. σ is a constant as a real part of functional zero. This means that ρ_n is a function only of ***n***.Let be the function:

$$U(x) = \frac{1}{\sqrt{x^{2\sigma}}}; \quad x > 0, x \in R$$

$$U^{/}(x) = -\frac{1}{x^{2\sigma}} \frac{1}{2\sqrt{x^{2\sigma}}} 2\sigma x^{2\sigma-1}; \quad x > 0 \cap x \in R$$

ISSN: 2321-8169
159 – 162

Hence U is a function only of **x** If $\sigma = \frac{1}{2}$. For $x = n \Rightarrow U(x) = U(n) = \rho_n$

That is possible for every $x > 0 \cap x \in R$, hence and for every $n \in N$.

The same result is obtained if instead lookcurvature $\kappa_n = \frac{1}{\rho_n}$.

. I.e. if now our function is

$$V(x) = \sqrt{x^{2\sigma}}; x \geq 0, x \in R.$$

Then

$$V^{/}(x) = \frac{1}{2\sqrt{x^{2\sigma}}} 2\sigma x^{2\sigma-1} \; x > 0 \cap x \in R$$

Hence ***V*** is a function only of ***x*** If $\sigma = \frac{1}{2}$. For $x = n \Rightarrow V(x) = V(n) = \kappa_n$. Again $\sigma = \frac{1}{2}$.

That is our opinion for Riemannian Hypothesis

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