

1056-11-48

Samuel W Gilbert* (sw.gilbert@yahoo.com), 8000 Towers Crescent Drive, Suite 1345, Vienna, VA 22182. *The Riemann Hypothesis and the Roots of the Riemann Zeta Function.*

This paper is a study of the geometric convergence of the Dirichlet series representation of the Riemann zeta function at its roots in the critical strip. The objectives are to understand why non-trivial roots occur in the Riemann zeta function and to define the roots mathematically.

The roots of the zeta function are the only points in the critical strip where infinite summation and infinite integration of the Dirichlet series terms are geometrically equivalent. Similarly, the roots of the zeta function with the real part of the argument reflected in the critical strip are the only points where infinite summation and infinite integration of the Dirichlet series terms with reflected argument are geometrically equivalent.

Simplified asymptotic expansions for the Dirichlet series terms of the Riemann zeta function at the roots, equated algebraically with simplified asymptotic expansions for the series terms of the zeta function with reflected argument at the roots, constrain the values of the real parts of both arguments to the critical line. Hence, the Riemann hypothesis is correct. It is also demonstrated that derived formulae yield calculated values of the imaginary parts of the roots of the Riemann zeta function with more than 330 correct significant figures. (Received July 13, 2009)