The Binary Goldbach Conjecture

Jan Feliksiak

[jan.feliksiak1@yahoo.com](mailto:jan.feliksiak1@yahoo.com)

ORCID ID 0000-0002-9388-1470

**Abstract.** The Goldbach Conjecture, one of the oldest problems in mathematics, has fascinated and inspired many mathematicians for ages. In 1742 German mathematician Christian Goldbach, in a letter addressed to Leonhard Euler, proposed a conjecture. The modern-day version of the Binary/Strong Goldbach conjecture asserts that: Every even integer greater than 2 can be written as the sum of two primes. The conjecture had been verified empirically up to 4 × 1018, its proof however remains elusive, which seems to confirm that:

*Some problems in mathematics remain buried deep in the catacombs of slow progress ... mind stretching mysteries await to be discovered beyond the boundaries of former thought. Avery Carr (2013)*

The research was aimed at exposition, of the intricate structure of the fabric of the Goldbach Conjecture problem. The research methodology explores several topics, before the definite proof of the Goldbach Conjecture can be presented. The Ternary Goldbach Conjecture Corollary follows the proof of the Binary Goldbach Conjecture as well as the representation of even numbers by the difference of two primes Corollary. The research demonstrates that the Goldbach Conjecture is a genuine arithmetical question.

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