Number of twin primes

Abstract

The arithmetic means of the prime number pairs with differences of 2, respectively 4 – aside from a few initial exceptions – belong to the infinite arithmetic series of even, respectively odd numbers divisible by 3. Therefore, the sequence numbers of the elements of the two series (infinite arithmetic series of integers) potentially represent the indicated prime number pairs. With suitable adaptations of the Complementary Prime Sieve (CPS), infinite arithmetic series of elements not representing the examined prime number pairs, can be marked between the sequence numbers. The method denotes an infinite number of sequence number elements multiple times.

The study by title shows in the case of 2-difference prime number pairs, and by analogy it assumes in the case of 4-difference prime number pairs, that those sequence number elements, which don't represent the examined prime number pairs - according to an algorithm, in the order of the prime numbers, in infinitely many grades assigned to them - are arranged into disjunct infinite arithmetic series, they can be gradually filtered out, (can be omitted) for each filtration grade. The number of series (or the total density of their elements) filtered out, per filtration grade, in each grade is less, than the number (or the average density) of elements not filtered out, by grade up to and including. Thus, in innumerable filtration grades, from infinite series-sets of sequence numbers, an infinite number of elements can be filtered out per grade. Consequently, **there must be an infinite number of elements - representing the prime number pairs examined - that cannot be filtered out.**

Applying the method of gradual filtration to the separation of prime numbers too, it can be shown, that **the First Hardy-Littlewood conjecture** for the number of twin primes, can be derived from the law of primes and is therefore **acceptable as a theorem**. This also proves that **there is an arithmetic mean of the twin primes between the squares of the prime numbers in the sequence.**

In the course of derivation, **it is advisable to supplement the known formula with a factor** $\varphi_{xk^*} := 1 + \{\ln(x^{1/2}) - \ln[\ln(x^{1/2}) - 1 - 1/\ln(x^{1/2})]\}^{-1} \approx \boldsymbol{\varphi_{xk} \sim \varphi = 1}$ depending on the number limit x, **in order to obtain a more accurate approximation of the number of twin primes.**