The New Prime theorem（22）

Hardy-Littlewood conjecture B: $P, P+k$

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Abstract

Using Jiang function we prove Hardy-Littlewood conjecture B: $P, P+k$ [4].

Theorem. We define prime equation

$$P_1 = P + k. \qquad (1)$$

For every even k there are infinitely many primes P such that P_1 is a prime.

Proof. We have Jiang function [1,2]

$$J_2(\omega) = \prod_P [P - 1 - \chi(P)], \qquad (2)$$

where $\omega = \prod_P P$, $\chi(P)$ is the number of solutions of congruence

$$q + k \equiv 0 \pmod{P}, \ q = 1, \cdots, P-1. \qquad (3)$$

If $P|k$ then $\chi(P) = 0$, $\chi(P) = 1$ otherwise.

Substituting it into (2) we have

$$J_2(\omega) = \prod_{3 \le P}(P-2) \prod_{P|k} \frac{P-1}{P-2} \ne 0. \qquad (4)$$

We prove that there are infinitely many primes P such that P_1 is a prime.

We have asymptotic formula

$$\pi_2(N,2) = \left| \{ P_1 < N : P + k = prime \} \right| \sim \frac{J_2(\omega)}{\phi^2(\omega)} \frac{N}{\log^2 N}, \qquad (5)$$

where $\phi(\omega) = \prod_P (P-1)$.

Remark. The prime number theory is basically to count the Jiang function $J_{n+1}(\omega)$ and Jiang prime k-tuple singular series $\sigma(J) = \frac{J_2(\omega)\omega^{k-1}}{\phi^k(\omega)} = \prod_P \left(1 - \frac{1+\chi(P)}{P}\right)(1 - \frac{1}{P})^{-k}$ [1,2], which can count the number of prime number. The prime distribution is not random. But Hardy prime k-tuple singular series $\sigma(H) = \prod_P \left(1 - \frac{\nu(P)}{P}\right)(1 - \frac{1}{P})^{-k}$ is false [3-8], which can not count the number of prime numbers.

References

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Szemerédi's theorem does not directly to the primes, because it can not count the number of primes. It is unusable. Cramér's random model can not prove prime problems. It is incorrect. The probability of $1/\log N$ of being prime is false. Assuming that the events "P is prime", "$P+2$ is prime" and "$P+4$ is prime" are independent, we conclude that P, $P+2$, $P+4$ are simultaneously prime with probability about $1/\log^3 N$. There are about $N/\log^3 N$ primes less than N. Letting $N\to\infty$ we obtain the prime conjecture, which is false. The tool of additive prime number theory is basically the Hardy-Littlewood prime tuple conjecture, but can not prove and count any prime problems[6].

本文是 1923 年由 Hardy and Littlewood 提出来到今天仍没解决只能算一个猜想，利用 Jiang function 给出严格证明，它是一个最简单素数定理。