

# The New Prime theorem (24)

Hardy-Littlewood conjecture K:  $x^3 + k$

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Abstract

Using Jiang function we prove Hardy-Littlewood conjecture K:  $x^3 + k$  [4].

**Theorem 1.** Let  $m$  be an even number which is not a cube.

$$P_1 = P^3 + m \quad (m \neq a^3). \quad (1)$$

There exist infinitely many primes  $P$  such that  $P_1$  is a prime.

**Proof.** We have Jiang function [1,2]

$$J_2(\omega) = \prod_p [P - 1 - \chi(P)], \quad (2)$$

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

$$q^3 + m \equiv 0 \pmod{P}, \quad q = 1, \dots, P-1. \quad (3)$$

We have

$$m^{\frac{P-1}{3}} \equiv 1 \pmod{P}. \quad (4)$$

If (4) has a solution then  $\chi(P) = 3$ . If (4) has no solutions then  $\chi(P) = 0$ .  $\chi(P) = 1$  otherwise.

For every even number  $m$  we have

$$J_2(\omega) \neq 0. \quad (5)$$

We prove that in (1) there are infinitely many prime solutions.

We have asymptotic formula [1,2]

$$\pi_2(N, 2) = \left| \{P \leq N : P_1 = \text{prime}\} \right| \sim \frac{J_2(\omega)\omega}{3\phi^2(\omega)} \frac{N}{\log^2 N}, \quad (6)$$

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

In the same way we are able to prove  $P_1 = P^3 - m$ .

**Theorem 2.** Let  $n$  be an odd number which is not a cube

$$P_1 = (2P)^3 + n \quad (n \neq a^3). \quad (7)$$

There exist infinitely many primes  $P$  such that  $P_1$  is a prime.

**Proof.** we have Jiang function [1,2]

$$J_2(\omega) = \prod_p (P-1 - \chi(P)), \quad (8)$$

where  $\chi(P)$  is the number of solutions of congruence.

$$(2q)^3 + n \equiv 0 \pmod{P}, \quad q = 1, \dots, P-1. \quad (9)$$

We have

$$n^{\frac{P-1}{3}} \equiv 1 \pmod{P}. \quad (10)$$

If (10) has a solution then  $\chi(P) = 3$ . If (10) has no solutions then  $\chi(P) = 0$ ,  $\chi(P) = 1$  otherwise. For every odd number we have

$$J_2(\omega) \neq 0. \quad (11)$$

We prove that there are infinitely many prime solutions in (7).

We have asymptotic formula [1,2]

$$\pi_2(N, 2) = |\{P \leq N : P_1 = \text{prime}\}| \sim \frac{J_2(\omega)\omega}{3\phi^2(\omega)} \frac{N}{\log^2 N}. \quad (12)$$

In the same way we are able to prove  $P_1 = (2P)^3 - n$ .

**Remark.** The prime number theory is basically to count the Jiang function  $J_{n+1}(\omega)$  and Jiang

prime  $k$ -tuple singular series  $\sigma(J) = \frac{J_2(\omega)\omega^{k-1}}{\phi^k(\omega)} = \prod_p \left(1 - \frac{1 + \chi(P)}{P}\right) \left(1 - \frac{1}{P}\right)^{-k}$  [1,2], which can count

the number of prime number. The prime distribution is not random. But Hardy prime  $k$ -tuple singular series

$\sigma(H) = \prod_p \left(1 - \frac{\nu(P)}{P}\right) \left(1 - \frac{1}{P}\right)^{-k}$  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  $N \rightarrow \infty$  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].

Mathematicians have tried in vain to discover some order in the sequence of prime numbers but we have every reason to believe that there are some mysteries which the human mind will never penetrate.

Leonhard Euler(1770)

It will be another million years,at least, before we understand the primes. Paul Erdos

中国到今天仍不承认蒋春暄成果。连母校北航不承认蒋春暄是北航学生，献给祖国中华和母校北航被拒绝。这就是今天的中国现况。