

The New Prime theorem (12)

$$3 \times a^3 \pm 1$$

Chun-Xuan Jiang

P. O. Box 3924, Beijing 100854, P. R. China
 jiangchunxuan@vip.sohu.com

Abstract: Using Jiang function we prove that $3 \times a^3 \pm 1$ has infinitely many prime solutions.

[Chun-Xuan Jiang. **The New Prime theorem (12)** $3 \times a^3 \pm 1$, *Academ Arena* 2015;7(1s): 15-15]. (ISSN 1553-992X). <http://www.sciencepub.net/academia>. 12

Keywords: prime; theorem; function; number; new

Theorem. We define the prime equation

$$P_1 = 3 \times (P-1)^3 + 1 \quad (1)$$

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

Proof. We have Jiang function[1]

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

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

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

we have

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

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

We prove $J_2(\omega) \neq 0$, there exist infinitely many primes P such that P_2 is a prime.

We have asymptotic formula [1]

$$\pi_2(N, 2) = \left| \left\{ P \leq N : 3 \times (P-1)^3 + 1 = \text{prime} \right\} \right| \sim \frac{J_2(\omega)\omega}{3\phi^2(\omega)} \frac{N}{\log^2 N} \quad (5)$$

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

In the same way we are able to prove that $3 \times a^3 - 1$ has infinitely many prime solutions.

Reference

1. Chun-Xuan Jiang, Jiang's function $J_{n+1}(\omega)$ in prime distribution. <http://www.wbabin.net/math/xuan2.pdf>.
2. Chun-Xuan Jiang. **Automorphic Functions And Fermat's Last Theorem (1)**. *Rep Opinion* 2012;4(8):1-6]. (ISSN: 1553-9873). http://www.sciencepub.net/report/report0408/001_10009report0408_1_6.pdf.
3. Chun-Xuan Jiang. **Jiang's function $J_{n+1}(\omega)$ in prime distribution**. *Rep Opinion* 2012;4(8):28-34]. (ISSN: 1553-9873). http://www.sciencepub.net/report/report0408/007_10015report0408_28_34.pdf.
4. Chun-Xuan Jiang. **The Hardy-Littlewood prime k-tuple conjecture is false**. *Rep Opinion* 2012;4(8):35-38]. (ISSN: 1553-9873). http://www.sciencepub.net/report/report0408/008_10016report0408_35_38.pdf.
5. Chun-Xuan Jiang. **A New Universe Model**. *Academ Arena* 2012;4(7):12-13] (ISSN 1553-992X). http://sciencepub.net/academia/aa0407/003_10067aa0407_12_13.pdf.

5/1/2015