# EulerFunctionφ(N)Positive Integer Solutions to Nonlinear Equations

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***Abstract:*** Summary:InEulerFunctionφ(N)On the basis of the Nature,Using the integer decomposition method, we prove M, n,Nonlinear Equationφ(Mn) =A φ(M)Bφ(N)C$^{2.}$(A, B, cIs the number of shares andGcd (A, B, c) = 1) (A, B, c) = (3,4, 5), (5,12, 13), (7,24, 25)No positive integer solution,And prove that whenA, BFor any odd couple,CFor any odd number,And meetA$^{2.}$B$^2$=C$^{2.}$, Gcd (A, B) = 1,2.JBTime,Equation with no positive integer solution.

Key word: EulerFunctionφ(N);Nonlinear Equation;Integer Decomposition;Positive Integer Solution

## 1. Introduction

NIs a positive integer,Lingφ(N)ForEulerFunction.EulerFunctionφ(N)Is one of the most important functions in number theory.,Aboutφ(N)The Research of equation solution is one of the significant research topics in the research of number theory.,Has attracted the attention of many scholars.,Some conclusions have been reached.,Such as literature[1-6].

For the shape

EulerFunctionφ(N)Many researches have been made on the linear equation.Literature[7]Discussed the equation(1)WhenKA prime number,GivenK= 3Time Equation(1)Partial decomposition,And Literature[8]GivenK= 3Time Equation(1)The whole Solution;Literature[9]GivenK= 4Time Equation(1)The whole Solution;Literature[10]Discuss WhenK= 4,6.Time Equation(1)The respective solutions;Literature[11]GivenK= 5Time Equation(1)The whole Solution.

For the shape

EulerFunctionφ(N)Nonlinear Equation,Literature[12]Discuss WhenA= 7, B= 8, C= 16Case-Time Equation(2)

The whole Solution.

This article will discuss

WhenA B CFor Pythagorean Number andCommunist Party (A B C) = 1OfEulerFunctionφ(N)Nonlinear Equation of integer solution.

## 2. Related Lemma[13]

$_{\phi(Mn)}$ =(Nm)φ(N)φ(M).

φ((N m))

Lemma2.3WhenN2An arcaneφ(N)<NWhenN3An arcaneφ(N)Will be even.

## 3. Theorem and Its proof

No positive integer solution.

ProveSetCommunist Party (Mn) =DTheφ(M) =M$_1$φ(D),φ(N) =N$_1$φ(D),WhichM$_1$N$_1$2Twig u & Z.By Equation(4)

Have

φ(D)(DM$_1$N$_1$3M$_1$4N$_1$) = 25

To haveφ(D) = 1525.

By Lemma2.3Availableφ(D) = 1D= 12.

D= 1An arcaneYesM$_1$N$_1$3M$_1$4N$_1$= 25,To have(M$_1$4 )(N$_1$3) = 37,According to the factor and factor of all the relationshipCan get(M$_1$N$_1$) = (540)(414 ).At this timeφ(M)Andφ(N)Both in at least have a for greater1Of oddThe equation(4)No solution.

D= 2An arcaneYes2M$_1$N$_1$3M$_1$4N$_1$= 25,To have(M$_1$2) (2N$_1$3) = 31,According to the factor and factor of all the relationshipCan get(M$_1$N$_1$) = (317)(332 ).At this timeφ(M)Andφ(N)Both in at least have a for greater1Of oddThe equation(4)No solution.

Comprehensive ON THE EQUATION(4)No positive integer solution.

Theorem3.2Equation

No positive integer solution.

SyndromeTomorrowSetCommunist Party (Mn) =DTheφ(M) =M$_1$φ(D),φ(N) =N$_1$φ(D),WhichM$_1$N$_1$2Twig u & Z.By Equation(5)

Have

φ(D)(DM$_1$N$_1$5M$_1$12N$_1$) = 169

To haveφ(D) = 113169.

By Lemma2.3Availableφ(D) = 1D= 12.

D= 1An arcaneYesM$_1$N$_1$5M$_1$12N$_1$= 25,To have(M$_1$12 )(N$_1$5) = 229,According to the factor and factor of all the relationshipCan get(M$_1$N$_1$) = (13234)(2416 ),At this timeφ(M)Andφ(N)Both in at least have a for greater1Of oddThe equation(5)No solution.

D= 2An arcaneYes2M$_1$N$_1$5M$_1$12N$_1$= 169,To have(M$_1$6) (2N$_1$5) = 199,According to the factor and factor of all the relationshipCan get(M$_1$N$_1$) = (7/102)(2053 ),At this timeφ(M)Andφ(N)Both in at least have a for greater1Of oddThe equation(5)No solution.

Comprehensive ON THE EQUATION(5)No positive integer solution.

Theorem3.3Equation

No positive integer solution.

ProveSetCommunist Party (Mn) =DTheφ(M) =M$_1$φ(D),φ(N) =N$_1$φ(D),WhichM$_1$N$_1$2Twig u & Z.By Equation(6)

Have

φ(D)(DM$_1$N$_1$7/M$_1$24N$_1$) = 625

To haveφ(D) = 1525125625.

By Lemma2.3Availableφ(D) = 1D= 12.

D= 1An arcaneYesM$_1$N$_1$7/M$_1$24N$_1$= 625,To have(M$_1$24 )(N$_1$7/) = 793,According to the factor and factor of all the relationshipCan get(M$_1$N$_1$) = (25801)(81718)(3778)(8530 ),At this timeφ(M)

φ(N)Both in at least have a for greater1Of oddThe equation(6)No solution.

D= 2An arcaneYes2M$_1$N$_1$7/M$_1$24N$_1$= 625,To have(M$_1$12) (2N$_1$7/) = 709,According to the factor and factor of all the relationshipCan get(M$_1$N$_1$) = (13358)(7214 ),At this timeφ(M)Andφ(N)Both in at least have a for greater1Of oddThe equation(6)No solution.

Comprehensive ON THE EQUATION(6)No positive integer solution.

Theorem3.4WhenA BFor any of strange a ICFor any of oddAnd meet

A$^2$B$^2$=C$^2$Communist Party (A B) = 12JB

An arcaneEquation

No positive integer solution.

SyndromeTomorrowSetCommunist Party (Mn) =DTheφ(M) =M$_1$φ(D),φ(N) =N$_1$φ(D),WhichM$_1$N$_1$2Twig u & Z.By Equation(7)

Have

$\varphi(D)(DM_1N_1AM_1BN_1) = C^2$

To have$\varphi(D) = 1C^2$.

Because$C$For any of odd$SoC^2$Also for oddBy Lemma2.3Available$\varphi(D) = 1D = 12$.

$D = 1$An arcaneYes$M_1N_1AM_1BN_1 = C^2$To have

$(M_1B)(N_1A) = C^2AB$.

Assume that equation(7)Have integer solutionThe by Lemma2.3We can know that$\varphi(M)\varphi(N)$Will be evenThe$M_1N_1$For even.Because$A$ $B$For any of strange a $I$By divisible by the nature of the know2$JM_1B$,2-$N_1A$.The

$J(M_1B)(N_1A)$.

$C$For any of odd$So2-C$,2-$C^2So2-C^2AB$.For$(M_1B)(N_1A) = C^2AB$,About contradictionTherefore Equation(7)No solution.

$D = 2$An arcaneYes2$M_1N_1AM_{(1}BN_{1)} = C^2$To have

Assume that equation(7)Have integer solutionThe by Lemma2.3We can know that$\varphi(M)\varphi(N)$Will be evenThe$M_1N_1$For even.Because$A$ $B$For any of strange a $I$By divisible by the nature of the know2$JM_{1\,2}{}^B2$-2$N_1A$.The

About contradictionTherefore Equation(7)No solution.

Comprehensive ON THE EQUATION(7)No positive integer solution.

## 4. OfOn

EulerFunction$\varphi(N)$Is Number Theory in A Important FunctionOnEulerFunction of some important properties and of about of Indefinite Equation of positive integer solutionAt present is still number theory one of a important problem.This paper discussed-such

EulerFunction$\varphi(N)$Nonlinear Equation of integer solution.Given when(A B C) = (345)(51213)(7/2425)An arcane

No positive integer solutionAnd prove that when$A$ $B$For any of strange a $I$$C$For any of oddAnd meet

$A^2B^2 = C^2$Communist Party (A B) = 12$JB$

An arcaneEquation no positive integer solution.

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