Vol.7.Issue.1.2019 (Jan-Mar.)
©KY PUBLICATIONS

http://www.bomsr.com
Email:editorbomsr@gmail.com

RESEARCH ARTICLE

BULLETIN OF MATHEMATICS AND STATISTICS RESEARCH

A Peer Reviewed International Research Journal

INTERNATIONAL STANDARD SERIAL NUMBER 2348-0580

ERDŐS–STRAUS CONJECTURE IS WRONG

SANZHONG ZOU
Rom 2106, No.228 Tianhe Rd Guangzhou, P. R. China
E-mail：75473066@qq.com
https://doi.org/10.33329/bomsr.71.59

ABSTRACT
Erdős -Straus conjecture can be proved wrong by mathematical induction.
Key words: Erdős -Straus conjecture; mathematical induction
MR (2010) **Subject classification** 11R04

1. Introduction

In number theory, the Erdős–Straus conjecture states that for all integers n ≥ 2, the rational number 4/n can be expressed as the sum of three positive unit fractions. Paul Erdős and Ernst G. Straus formulated the conjecture in 1948.[1] It is one of many conjectures by Erdős.

That is $\forall n > 1$, $\exists: \frac{4}{n} = \frac{1}{x} + \frac{1}{y} + \frac{1}{z}$, $n > 1$, $x > 0, y > 0, z > 0$ ， x,y,z is a positive integer.

2. Proof of proposition

$\frac{4}{n} = \frac{1}{x} + \frac{1}{y} + \frac{1}{z}$, $n > 1, x > 0, y > 0, z > 0$That is$\frac{4}{n} = \frac{yz+xz+xy}{xyz}$,

n=$\frac{4xyz}{yz+xz+xy}$, $n > 1, x > 0, y > 0, z > 0$..... (1)

Using Mathematical Induction to Prove：

In （1） ， when $n = 2$ ， set：$x = 2, y = 2, z = 1$,then (1) there is：n=$\frac{4\times2\times2\times1}{2\times1+2\times1+2\times2} = 2$

The equation holds.

Let: When n = m, the equation also holds, $m = \frac{4xyz}{yz+xz+xy}$

Then when n=m+1 there is:m+1 $= \frac{4xyz}{yz+xz+xy}$ +1

That is： m+1= $\frac{4xyz}{yz+xz+xy} + \frac{yz+xz+xy}{yz+xz+xy} = \frac{4xyz+yz+xz+xy}{yz+xz+xy}$

$\because 4xyz + yz + xz + xy$ it must be $4xyz$, canm+1= $\frac{4xyz}{yz+xz+xy}$, $\therefore yz + xz + xy = 0$,

however $yz + xz + xy \neq 0$, So (1) does not hold, so the Erdős–Straus conjecture is wrong.

REFERENCES

[1] Chaohao Gu, Mathematics Dictionary, *Shanghai Dictionary Press*, (1992)