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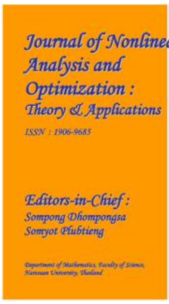

FUZZY PRIME FRACTIONAL LABELING OF SPECIAL GRAPHS

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ABSTRACT
This paper examines the existence of bimagic labeling of the Fan graph and fuzzy prime fractional labeling of the Helm graph.
Key words: Fuzzy Labeling, Prime Fractional Labeling, BiMagic Labeling, Prime Fractional Magic Labeling, Fan graph, Helm graph .

1. INTRODUCTION
The fuzzy set was introduced by Zadeh as a class of objects with a range of membership grades. In contrast to traditional crisp sets, which are defined by either membership or non-membership, the fuzzy method deals with the grade of membership between [0, 1] expressed in terms of the membership function of a fuzzy integer. Zadeh first proposed the idea of a fuzzy connection on a set in 1965. Kaufmann developed the fuzzy graph notion in 1973, and Rosenfield developed the fuzzy graph structure in 1975.Fuzzy prime fractional labeling of the Helm graph and fuzzy prime fractional Bimagic labeling of the Fan graph are discussed in this work.

2. PRELIMINARIES
2.1 Definition
Let C^* = (V, E) be a simple graph. Then C^* = (φ,ψ) is called a fuzzy graph on C^*, if φ: V → [0, 1] and ψ: E → [0, 1] and for all $x,y \in E$.
ψ (x, y) ≤ min [φ(x), φ (y)]
A fuzzy graph C= (φ, ψ)) on C^* is called a fuzzy labeling graph if φ and ψ one to one maps for all x, $y \in E$.
2.2 Definition
Graph of prime labeling Consider a network with P vertices, C = (V|C), (E|C). A prime labeling is a bijection f: V(C) → {1, 2,…p} if, for each edge, gcd (f|u), (f|v) = 1. A prime graph is one that admits prime labeling.
2.3 Definition
By adding a pendent edge to each vertex of the n-cycle, the Helm graph was created from a wheel.

3. FUZZY PRIME FRACTIONAL LABELLING OF HELM GRAPH
3.1 Preposition
There is a prime fractional labeling for each fuzzy Helm graph.
Proof:
Using the standard Helm graph Hn, we can identify the vertices as prime fractional numbers by labeling them as follows: i=1,2…..p.

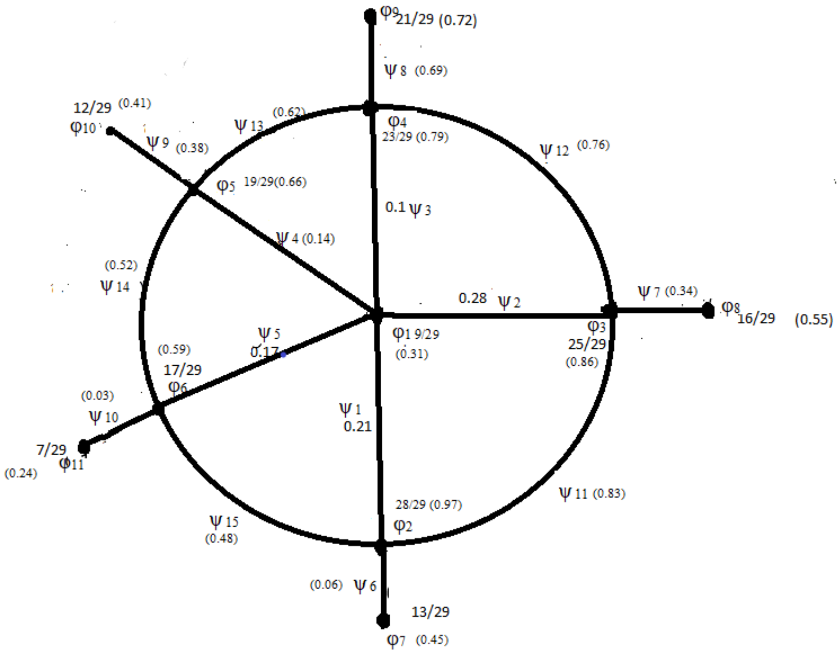
$$\varphi(V_i) = \frac{4n-1}{p}, \; n=4,5,11$$
$$= \frac{4n}{p}, \; n=2,8,10$$
$$= \frac{4n+1}{p}, \; n=1,3,6,9$$

and $\psi(ei) \rightarrow [0,1]$ labelled as $\psi(ei) = \frac{i}{p}$ attains a Prime fractional fuzzy labeling with Gcd 0.01. Consider a prime fractional number $\frac{P_i}{29}$ that satisfying the conditions of prime labeling and fuzzy labeling for Helm (H_5) graph.

3.1 Example

Consider a Helm (H_5) graph for all $1 \leq i \leq 29$, we define $\psi(ei) = \frac{i}{29}$ and $\varphi(V_1) = 9/29$, $\varphi(V_2) = 28/(29)$, $\varphi(V_3) = 25/29$, $\varphi(V_4) = 23/29$, $\varphi(V_5) = 19/29$,
$\varphi(V_6)=17/29$, $\varphi(V_7)=13/29$, $\varphi(V_8)=16/29$, $\varphi(V_9)=21/29$, $\varphi(V_{10})=12/29$, $\varphi(V_{11})=7/29$. .

$\psi_1<$ min (0.31,0.97)
0.21 (6/29)<min (0.31, 0.97)
Gcd ((0.31, 0.97) = 0.01
$\psi_2 <$ min (0.31, 0.86)
0.28(8/29)< min (0.31, 0.86)
Gcd (0.31, 0.86) = 0.01
$\psi_3 <$ min (0.31, 0.79)
0.1 (3/29) < min (0.31, 0.79)
Gcd (0.31, 0.79) = 0.01
$\psi_4 <$ min (0.31, 0.66)
0.14(4/29) < min (0.31, 0.66)
Gcd ((0.31, 0.66) = 0.01
$\psi_5 <$ min (0.31, 0.59)
0.17(5/29) < min (0.31, 0.59)
Gcd (0.31, 0.59) = 0.01
$\psi_6<$ min (0.97, 0.24)
0.06(2/29)< min (0.97, 0.24)
Gcd (0.97, 0.24) = 0.01
$\psi_7<$ min (0.86, 0.55)
0.34(10/29)< min (0.86, 0.55)
Gcd (0.86, 0.55) = 0.01
$\psi_8<$ min (0.79, 0.72)
0.69(20/29) < min (0.79, 0.72)
Gcd (0.79, 0.72) = 0.01
$\psi_9<$ min (0.66, 0.41)
0.38(11/29)< min (0.66, 0.41)
Gcd (0.66, 0.41) = 0.01
$\psi_{10}<$ min (0.59, 0.24)
0.03(1/29) < min (0.59, 0.24)
Gcd (0.59, 0.24) = 0.01
$\psi_{11}<$ min (0.97, 0.86)
0.83(24/29)< min (0.97, 0.86)
Gcd (0.97, 0.86) = 0.01
$\psi_{12}<$ min (0.86, 0.79)
0.76(22/29)< min (0.86, 0.79)
Gcd (0.86, 0.79) = 0.01
$\psi_{13}<$ min (0.79,0.66)
0.62(18/29)< min (0.79,0.66)
Gcd (0.79,0.66) = 0.01
$\psi_{14}<$ min (0.66,0.59)
0.52(15/29)< min (0.66,0.59)
Gcd (0.66,0.0.59) = 0.01
$\psi_{15}<$ min (0.59,0.97)
0.48(14/29)< min (0.59,0.97)
Gcd (0.59,0.97) = 0.01



Helm Graph H5

Therefore the Helm graph H_5 satisfying the prime fractional labeling of fuzzy graph with Gcd 0.01.

4. FUZZY PRIME FRACTIONAL AND BIMAGIC LABELLING OF FAN GRAPH

4.1 Definition

A fan graph Fm,n is defined in graph theory as the graph that joins Km + Pn, where Pn is the path graph on n nodes and Km is the empty graph on m nodes.

4.2 Definition

A prime fractional fuzzy labeling graph C = (φ, ψ) on C is called prime fractional fuzzy magic labeling graph if there exists m∈ (0, 3), which is called magic value such that for all x, y ∈E.

$\varphi(x) + \varphi(y) + \psi(x, y) = m$

4.3 Definition

If the total membership values of the vertices and edges incident at the vertices are k1 and k2, where k1 and k2 are constants, then a fuzzy labeling graph admits Bi-magic labelling

4.1 Preposition

Every fuzzy fan graph $F_{1,n}$ is a fuzzy prime fractional bimagic labeling of graphs.

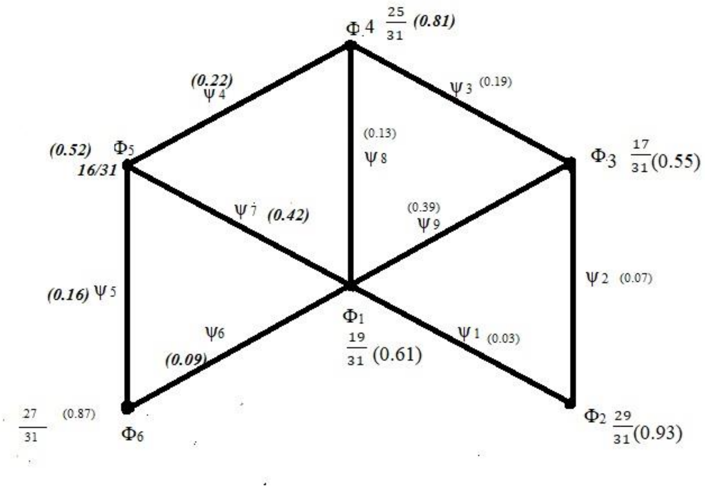
Proof:

Take a look at the standard fan graph F1,n. If p is a prime number and Φn is the number of other vertices in the fan graph with n nodes, then the central vertex, denoted by Φ1, is 4n-1/p. With F=4n-1/p and Φn>1, a fan in the fuzzy graph is made up of two node sets, Φ1 and Φn, such that Ψ(Φ1,Φi)>0 where i=1 to n and Ψ(Φi,Φi+1)>0 where i=1 to n-1. If φ (x) + φ (y) + ψ (x, y) = k1 and k2, then the fan graph is a fuzzy prime fractional bimagic labeling graph that satisfies this condition.

4.1 Example

Consider the prime fractionals 1/(31), 2/(31), 3/31, 4/31, etc. Examine the Fan graph F1,5 to see if it meets the requirements for magic labeling and prime fractional labeling.

$\Psi(e_i)=\frac{i}{31}$, $\Phi(v_1)=\frac{19}{31}$, $\Phi(v_2)=\frac{29}{31}$, $\Phi(v_3)=\frac{17}{31}$, $\Phi(v_4)=\frac{25}{31}$, $\Phi(v_5)=\frac{16}{31}$,$\Phi(v_6)=\frac{27}{31}$



Fan Graph $F_{1,5}$

A Fan graph satisfying the prime fractional labeling and magic labeling conditions.

$\varphi_1 (x) + \psi_1 (x) + \varphi_2 (x) = 1.57$

$0.61 + 0.03 + 0.93 = 1.57$

$\varphi_2 (x) + \varphi_3 (x) + \psi_2 (x) = 1.55$

$\varphi_3 (x) + \psi_3 (x) + \varphi_4 (x) = 1.55$

$\varphi_4 (x) + \psi_4 (x) + \varphi_5 (x) = 1.55$

$\varphi_5 (x) + \psi_5 (x) + \varphi_6 (x) = 1.55$

$\varphi_6 (x) + \psi_6 (x) + \varphi_1 (x) = 1.57$

$\varphi_1(x) + \psi_7 (x) + \varphi_5 (x) = 1.55$

$\varphi_1(x) + \psi_8 (x) + \varphi_4 (x) = 1.55$

$\varphi_1 (x) + \psi_9 (x) + \varphi_3 (x) = 1.55$

5. CONCLUSION

The definitions of fuzzy prime fractional magic labeling conditions of Fan graph and prime fractional fuzzy labelling of Helm graph have been studied in this study.

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