Advanced International Journal of Multidisciplinary Research

E-ISSN: 2584-0487
editor@aijmr.com

Volume 4, Issue 6, November-December 2026

CrossRef DOI: 10.62127/aijmr.2026.v04i06.1592

Fibonacci Square Difference Slither Labeling of Sierpinski Gakset Graph

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Abstract:
In Mathematics, Fibonacci Numbers occupy a special place thanks to its galaxy of applications in varied fields. Equally, labeling in graph theory has its share of applications in almost all spheres of technology. This research article juxtaposes the Fibonacci numbers, slither labeling and the square difference labeling to a special type of triangle tessellate, the Sierpinski Gasket graph.

Keywords: Fibonacci labeling, Square Difference Labeling, Slither labeling, Sierpinski Gasket Graph.

APPROACH:
The main approach of this research paper is to verify the applicability of Fibonacci Square Difference Slither Labeling to the Sierpinski Gasket graph by the systematic labeling the vertices of the graph using the Fibonacci numbers in the slither pattern and apply the square difference labeling.

INTRODUCTION:
The Fibonacci numbers play a significant role in the field of Business transactions and computer aided solicitations. Apart from these, these numbers have contributed considerably in the documentation of growth formation in flowers etc. These applications have inspired the researchers worldwide to make use of these numbers and prove sundry results. An attempt has been made in this paper to introduce Fibonacci numbers to a graph labeling.

SIGNIFICANT DEFINITONS:
FIBONACCI NUMBERS:
Fibonacci numbers are unambiguous sequence of non-negative integers that begin with 0. The numbers in the sequence are gotten by the sum of previous two numbers.

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SQUARE DIFFERENCE LABELING:
The concept of square sum labeling of graphs as given by Mitesh J. Patel and G.V. Ghodasara [4] is; "A graph G is square summed if there is a leeway to define a bijective map w:V(G) → {0,1,2,..p -1} such that the induced function w*:E(G) → ℕ given by w*(uv) = $(t(u))^2$ + $(t(v))^2$, for each edge uv ∈ E(G) is an injective map". In a similar way, the square difference can be defined as the absolute value of w*(uv) = $(t(u))^2$ - $(t(v))^2$, for each edge uv ∈ E(G).

SLITHER LABELING: The task of allocating numbers to the vertices or edges or both in a graph defines the idea of labeling. The slither labeling is the assignment of numbers in the slither formation.

TESSELLATION:
The process of constructing geometric shapes in such a way that they overlap and sans space between them. Such a process is called tiling or tessellation.

SIERPINSKI GASKET GRAPH:
The Sierpinski Gasket or Sierpinski Triangle Graph S_n is a distinct type of triangle tiling in which an equilateral triangle is subdivided to unremitting internal division of equilateral triangles from the mid points. The number of vertices in S_n is $\frac{3}{2}(3^{n-1}+1)$ and the number of edges is 3^n. The Sierpinski Gasket graph formed on exactly 3 vertices is a triangle, also known as, a complete graph on 3 vertices and is denoted by S_1.

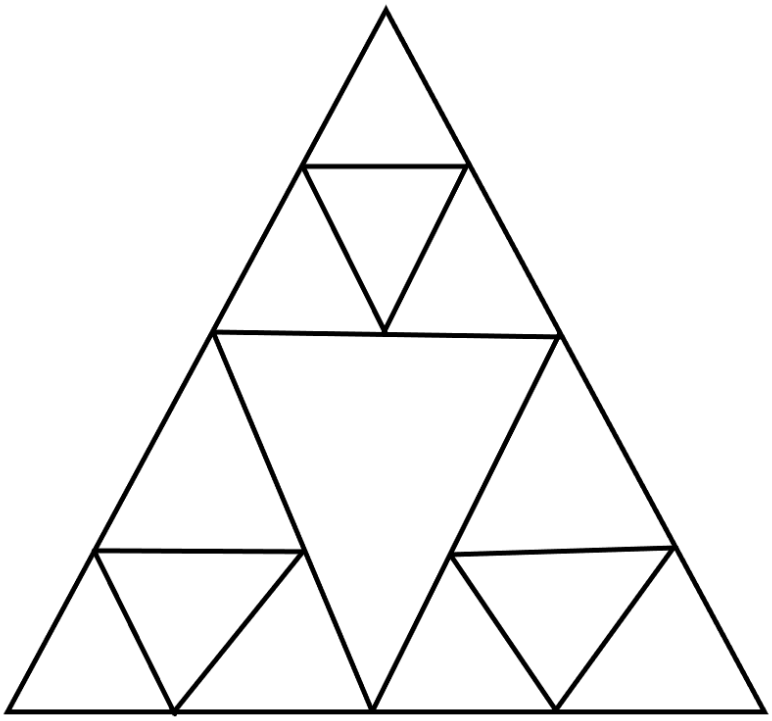


Fig 1. Sierpinski Gasket Graph S_3.

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MAIN RESULT:

The graph S_n admits Fibonacci Square Difference Slither labeling for n > 1.

Proof: Consider the Sierpinski Gasket Graph Sn formed on n vertices. Slither label the vertices of the graph using the non-negative Fibonacci numbers in a fashion that the labels of the vertices are non-repeating. Let n = 2 be arbitrary. The number of vertices in S_2 is 6 and the number of edges is 9.

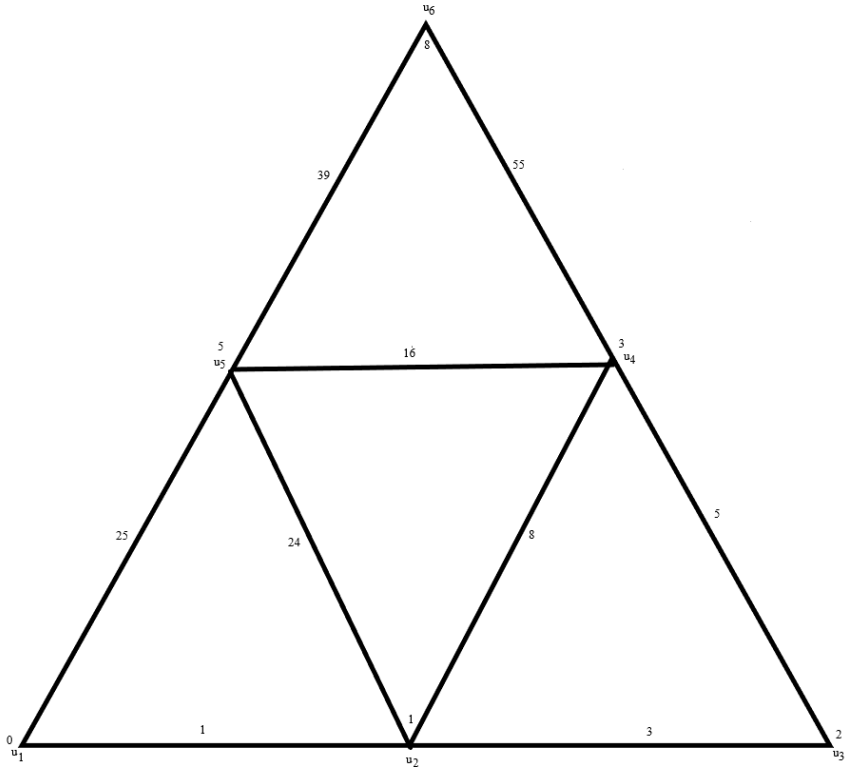


Fig 2. Fibonacci Square Difference Slither Labeling in S_2.

In the Sierpinski Gasket graph given above, the vertices are slither labelled using the Fibonacci numbers, the non-negative integers making sure that the labels of the vertices are all discrete. The label of an edge is the absolute value of the square difference of the labels of the vertices that are incident with it. That is, $e_{ij} = \left|u_j^2 - u_i^2\right|$ for all i and j.

The above labeling formation ensures that the labels of the edges are all distinct and so the acceptance of the Fibonacci Square Difference Slither Labeling for S_2 is established. As n = 2 is arbitrary, the result holds good for all values of n ≥ 3. Therefore, the Sierpinski Gasket Graph is Fibonacci Square Difference Slither Labelled.

CONCLUSION:

In this article, two different types of labeling using Fibonacci numbers namely, Square Difference Labeling and the Slither Labeling are juxtaposed into a single type and the same has been applied to the

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Sierpinski Gasket graph and it has been proved to accept the same. Similarly, the same concept can be applied and the acceptance can be verified to different graphs.

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