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REVIEWER'S REPORT

Manuscript No.: IJAR-50626 Date: 14-03-2025

Title: Miraj\'s Cubo: A Comprehensive Exploration of Relation of Cubic Identities with Square Numbers

Recommendation:
Accept as it is……**YES……**
Accept after minor revision……
Accept after major revision ……
Do not accept (*Reasons below*) ……

Rating	Excel.	Good	Fair	Poor
Originality	√			
Techn. Quality		√		
Clarity		√		
Significance			√	

Reviewer's Name: Mir Tanveer

Reviewer's Decision about Paper: **Recommended for Publication.**

Comments (*Use additional pages, if required*)
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Reviewer's Comment / Report

This paper presents **Miraj's Cubo**, a novel mathematical identity that reinterprets the sum of cubes by expressing it in terms of the difference of squares. The work introduces the parameter **'m' (Miraj's Change)** as a crucial component in this transformation, offering a new perspective on cubic identities and their algebraic relationships.

Abstract Analysis

The abstract provides a **clear overview** of the proposed identity and its significance. It outlines the traditional sum of cubes formula and highlights the introduction of Miraj's Cubo as a **fresh approach** to expressing this sum. The concept of the **parameter 'm'** and its role in balancing the relationship between the two cubic terms is well-articulated. Furthermore, the abstract effectively communicates both the **theoretical and practical implications**, including potential

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applications in algebraic manipulation, modular arithmetic, and computational efficiency. The discussion on its pedagogical value adds an additional layer of significance to the research.

Introduction & Theoretical Framework

The introduction situates the work within the broader **historical and mathematical context**. By referencing classical algebraic identities and Ramanujan's inquiries into cubic expressions, the study **establishes a strong foundation** for the exploration of Miraj's Cubo. The section on the **genesis of the identity** provides insight into the motivation behind the research, demonstrating a natural progression from classical identities to this new formulation.

Derivation & Mathematical Validation

The paper thoroughly develops and **derives Miraj's Cubo step-by-step**, ensuring **logical consistency** and mathematical rigor. The expansion of the proposed formula and its validation through algebraic transformations reinforce the correctness of the identity. The systematic breakdown of the **difference of squares approach** highlights the core contribution of the study.

The introduction of $m = (1/4)(1+(b/a)^3)$ as a defining parameter is a key element, providing a **dynamic interpretation** of how the sum of cubes can be related to quadratic expressions. The **behavioral analysis** of 'm' under different conditions ($b = 0$, $b = a$, $b >> a$) enhances the theoretical depth of the study. The paper successfully conveys how 'm' **adapts to the relative values** of a and b, making it a meaningful parameter in algebraic analysis.

Applications & Implications

The discussion of applications effectively demonstrates the **utility of Miraj's Cubo** in algebraic simplifications and polynomial factorizations. The transformation of cubic expressions into **quadratic identities** is particularly notable for its potential impact in **computational mathematics and algorithmic efficiency**. The exploration of its **geometric and algebraic properties** opens avenues for further research into higher-dimensional algebra and other mathematical fields.

Conclusion

Overall, this paper **presents a well-structured and insightful contribution** to algebraic mathematics. The introduction of Miraj's Cubo offers a **novel approach** to understanding cubic identities, and the derivation is mathematically sound. The **inclusion of parameter 'm'** as a

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transformation factor strengthens the theoretical framework, making it a potentially useful tool in algebraic manipulations, computational mathematics, and even pedagogy.

The work invites further exploration, particularly in modular arithmetic, algorithmic efficiency, and polynomial identity analysis, reinforcing its relevance in both theoretical and applied mathematics.