Review of: "Unified Inversion Method for Solving Polynomial Equations: A Reverse Detour to the Common Procedure"

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Potential competing interests: No potential competing interests to declare.

The paper presents a novel inversion-based method for solving polynomial equations, offering an alternative to classical approaches by focusing on a reverse route from complex numbers to real roots. While the approach is conceptually interesting and unified, the lack of mathematical rigor, practical examples, and comparative analysis limits its immediate impact. Expanding on these aspects and addressing the generalizability of the method would significantly enhance the paper's value and applicability. This paper introduces a **unified inversion method** for solving polynomial equations of degrees 2, 3, and 4. The proposed method inverts the roots of polynomial equations by focusing on the dependent variable, applying nth-root inversions to directly express roots in solvable radical forms. The method provides an alternative to classical approaches like Cardano's method for cubic equations or Ferrari's for quartic ones. The discussion emphasizes the novelty of starting with complex numbers to derive real and complex roots naturally and systematically.

Suggestions for Improvement

1. Discuss situations where this method might be advantageous or less efficient.
2. Discuss the potential to generalize the method for higher-degree polynomials (e.g., quintic equations or beyond).
3. Address whether the method is compatible with polynomials that cannot be solved explicitly using radicals.
4. Elaborate on why starting with complex numbers and deriving real roots (instead of vice versa) is advantageous. How does this improve or simplify root-finding?
5. Explore real-world or computational scenarios where the inversion method might offer unique advantages, such as in algebraic software tools or teaching environments.