Review of: "The Eisenlohr-Farris algorithm for fully transitive polyhedra"

Sayed Mohamad Mirfatah[1]

1 Amirkabir University of Technology

Potential competing interests: No potential competing interests to declare.

Title: Review of "The Eisenlohr-Farris algorithm for fully transitive polyhedra" by Eric Pauli Perez

The manuscript presents a method for classifying fully transitive polyhedra in three-dimensional space based on the conjugation classes of crystallographic groups in E3. The algorithm is attributed to J. M. Eisenlohr and S. L. Farris and aims to generate all polyhedra on which a given crystallographic group acts fully-transitively. The paper provides a historical context, algorithm description, and an illustrative example.

To the extent of my knowladge, the abstract and introduction provide a clear overview of the manuscript's purpose and content. The paper is well-structured and presents relevant background information, necessary definitions, and context for the proposed algorithm. The flow of ideas is logical and coherent, making it easy for readers to follow.

The paper addresses the important task of classifying fully transitive polyhedra in three-dimensional space, a challenging problem that has been the subject of previous research efforts. The proposed Eisenlohr-Farris algorithm is claimed to generate all such polyhedra based on crystallographic groups. While the topic is valuable and has practical implications, the manuscript does not clearly demonstrate how the algorithm advances the existing state of knowledge in the field.

The technical content seems sound, and the provided definitions and theorems are appropriate for the subject matter. The manuscript references relevant prior works, demonstrating the author's familiarity with the literature. However, it would be beneficial to provide more explicit explanations and mathematical details for the algorithm's steps to ensure reproducibility and to aid readers with less background in the field.

The example provided in Section 6 helps illustrate the application of the algorithm, particularly regarding vertex figures and face construction. However, the figures could be improved to enhance clarity. For instance, additional labels and annotations should be added to figures to help readers better understand the processes described in the text.

The manuscript claims that the algorithm can generate all fully transitive polyhedra in E3 based on crystallographic groups. However, a thorough evaluation of the algorithm's effectiveness is missing. The author should provide quantitative analyses, demonstrate the algorithm's efficiency and scalability, and compare its results with those obtained through other existing methods, if available.

The discussion of the proposed algorithm's strengths, limitations, and potential applications is limited. The conclusions should highlight the main findings, the significance of the results, and future directions for research in this area.

To say in nut shell, the manuscript presents a valuable contribution to the field of polyhedra classification based on fully transitive groups. However, it requires significant revisions to improve clarity, add mathematical rigor, evaluate the algorithm's performance, and provide a more comprehensive discussion and conclusion.

As it stands, I cannot recommend publication of the manuscript in its current form. The authors should revise the paper to address the aforementioned issues. If the revisions are adequately addressed and the algorithm's effectiveness is demonstrated through rigorous evaluations, the paper could be considered for publication in this journal.