Review of: "A New Family of Solids: The Infinite Kepler-Poinsot Polyhedra"

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Potential competing interests: No potential competing interests to declare.

The goal of this paper is to suggest a way of visualizing regular polyhedron of various type, i.e. Platonic solids, Kepler-Poinsot type of self-intersecting solids, Coxeter-Petrie type of infinite constructions and a new class obtained by synthesizing the latter two types. A remarkable fact about these solids is duality. However, the duality relation is hard to visualize, especially when we close their faces. The author suggests breaking up with this tradition to improve visualization and demonstrates it with several examples.

However, the paper has rather little scientific value and needs more rigorous content. At least we need a comparative approach on various possible visualization techniques (e.g. 2D projections, 3D models, Open faces, all of these with color distinctions etc). A more general question which needs to be addressed is whether and when visualization is really necessary. That is, how about its alternatives, i.e perception and imagination? How much complementary between these three are there in general, and in the current context? The author might want to consult to

- Geometry and the Imagination (AMS, 1999) by David Hilbert and S. Cohn-Vossen;
- Three-Dimensional Geometry and Topology, Vol. 1 (1997) by William P. Thurston;

- Visual Geometry and Topology (Springer, 1994) by Anatolij T. Fomenko

for deeper insights.

Some mathematical rigor is absolutely necessary for a better presentation. For example, the main object, a regular polyhedron, is defined as the same regular polygonal faces meeting with the same spatial (solid) angle at each vertex. However, Schlafli symbols which are used throughout the paper do not specify angles; instead it gives the type of faces and the number of faces that meet at each vertex. So, there is an inconsistency. Moreover, spatial angles become rather obsolete with open cubohemioctahedron and in the new type of infinite polyhedron.

Finally, novelty is another concern. It is highly likely that someone has already noticed the advantage - indeed the author mentions Leonardo da Vinci (by the way what happened to his approach afterwards?).