MODELING SPACE BY STEREOGRAPHIC REJECTION

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ABSTRACT:

3D geo-information analyses topological and metrical relationships between spatial objects. This analysis needs a suitable representation of the three-dimensional world. This paper proposes to use the 4D unit sphere as a model. In essence this model is already present in mathematical theories like Lie sphere geometry, Moebius geometry and Geometric Algebra. The forementioned theories use the stereographic projection implicitely to build the model. This paper explicitely uses this geometric transformation to introduce the model as simply as possible following both an intuitive geometric and a formal algebraic self-contained way. The calculation in a CAD-environment of 3D Voronoi cells around given 3D points gives a straightforward example of the topological and metrical capabilities of this model. The addition of geometrical meaningful algebraic operations to the model will increase its computational power.

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