

A study about the axiomatic system of spherical origami construction

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Construction through axiomatic folding methods proposed by H. Huzita is based on marking figures in the manner of origami: instead of a ruler and a compass, 'creases' are used as tools to shape figures; i.e., a crease given by folding can simultaneously make coincidences of points and segments in its reflection. Huzita referred to these basic folding steps as 'axioms' and defined seven such origami axioms. After Huzita's work was published, Justin and Hatori proposed another proposition - i.e., an 8th axiom [that was not mentioned in Huzita's paper], and also proved that their discovery completes the axiomatic formulation proposed by Huzita. Here we have their established eight axioms. To begin with in our presentation, we formulate the above axioms in figure 1.

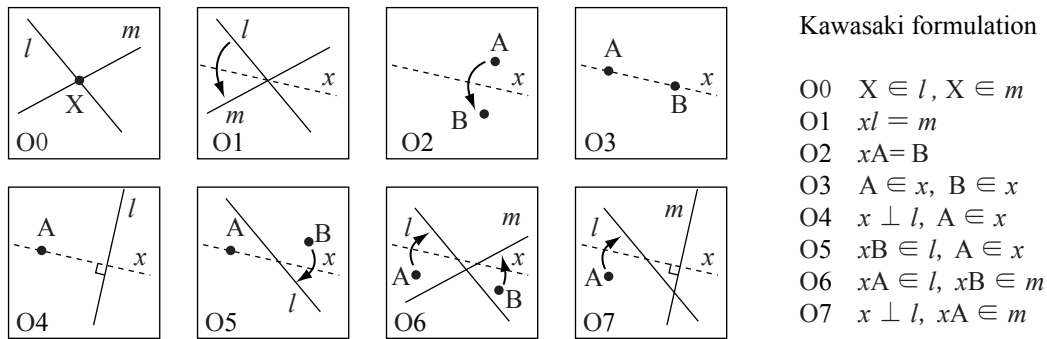


Figure1. Axiomatic system of origami construction and Kawasaki formulation.

Next, we will reformulate the above-mentioned axioms into the axioms with respect to spherical folding: notice that each point and its antipodal point on the sphere are to be paired in our study. Considering the correspondence between two poles and the equator (great circle) of the sphere (Figure 2), we propose that the above eight axioms can be reduced into the four axioms shown in Figure 3.

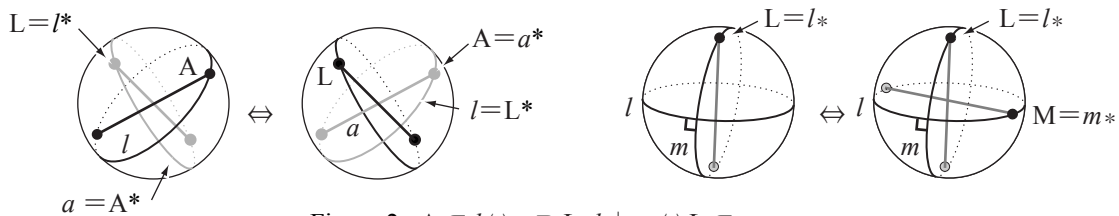


Figure 2. $A \in l \Leftrightarrow a \in L, l \perp m \Leftrightarrow L \perp m$

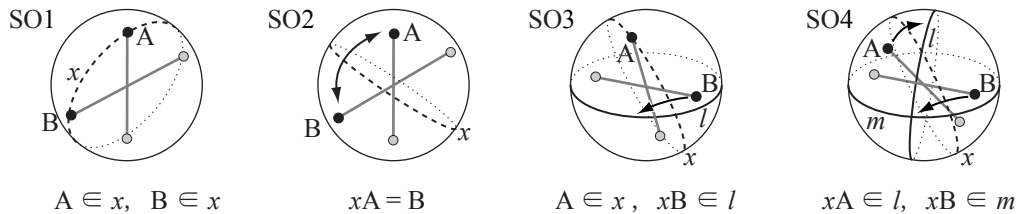


Figure 3. Axiomatic system of spherical origami construction.