Session 3 *(In preparation for Class 3, students are asked to view Lecture 3.)*

Topics for Class 3

Single-vertex crease patterns: Linear-time algorithm, local foldability examples, T-shirt folding, higher dimensions, why flat foldability?

Detailed Description of Class 3

This class addresses these questions/comments about Lecture 3 (and Lecture 2):

- How can we quickly determine whether a single-vertex mountain-valley pattern is flat foldable? We'll also cover the algorithm for 1D flat folding that we didn't have time to cover in Class 2.
- Examples of how the local foldability algorithm works.
- T-shirt folding (for fun)
- Higher-dimensional flat folding (what little is known)
- Why do we study flat foldability? Art (e.g. tessellations), practicality (compactness e.g. airbags), and mathematics (e.g. rigid foldability).

Topics for Lecture 3

Single-vertex crease patterns: Characterizations of flat-foldable crease patterns and mountain-valley patterns, combinatorics of the latter, local flat foldability is easy.
Tree method of origami design: Introduction, uniaxial base, demo.

Detailed Description of Lecture 3

This lecture is about the local behavior of flat folding around each vertex of a crease pattern. In other words, we study each vertex individually, by characterizing all single-vertex crease patterns and mountain-valley patterns that are flat foldable. Then we look at how to combine multiple vertices into a "locally foldable" crease pattern.

We also get started on the tree method of origami design, developed by many Japanese origami designers over the years, and turned into an algorithm and computer program TreeMaker by Robert Lang. This method has been the most successful in transforming complex origami design, and we'll cover more of it next lecture.

6.849 Geometric Folding Algorithms: Linkages, Origami, Polyhedra
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