

Session 14 *(In preparation for Class 14, students are asked to view Lecture 14.)*

Topics for Class 14

Hinged dissections: animations, polyform inductive construction, rectangle to rectangle, furniture, pseudopolynomial construction, 3D, Dehn invariant.

Detailed Description of Class 14

This lecture covers four additional results:

- How polyform (polyomino, polyiamond, polyhex, polycube, etc.) hinged dissection works
- How rectangle-to-rectangle (nonhinged) dissection works
- How we obtain a pseudopolynomial bound on hinged dissection
- How (nonhinged) dissection works in 3D and 4D: the Dehn invariant

Along the way, we'll see some fun examples of animation and furniture.

Topics for Lecture 14

Hinged dissections: Locked and unlocked chains of planar shapes, adorned chains, slender adornments, slender implies not locked, Kirszbaun's Theorem, locked triangles with apex angle $> 90^\circ$; existence of hinged dissections, refinement.

Detailed Description of Lecture 14

This lecture is about chains of polygons, or other 2D shapes, connected together by hinges in 2D. These structures are classically called “hinged dissections”. On the foldability side, we'll see some surprisingly general situations, called “slender adornments”, where these chains cannot lock, building on the Carpenter's Rule Theorem and expansiveness (Lecture 10). We'll also see some examples that do lock, building on our theory of infinitesimally locked linkages and Rules 1 and 2 (Lecture 11). On the design side, we'll show that we can actually design hinged dissections that fold into any finite collection of desired polygonal shapes, using slender adornments to guarantee foldable motions.

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6.849 Geometric Folding Algorithms: Linkages, Origami, Polyhedra
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