Edge unfolding convex polyhedra

6.885
L10.4
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- implicitly dates back to Albrecht Dürer's 1525 *The Painter's Manual*
- possible for all examples we've tried
  - e.g. Archimedean
  - heuristic (exhaustive) search e.g. HyperGami
  - Schlickenrieder 1997
- all general algorithms fail on some examples (nonexhaustive)
- some simple examples overlap e.g. tetrahedron

- random unfolding of random example seems to overlap with probability $\to 1$ as $n \to \infty$ [Scheron & O'Rourke (1987)]
  - unfolding: spanning tree
  - example: convex hull of rand. points on sphere

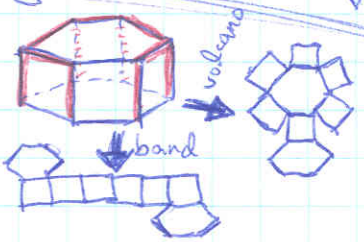
OPEN: prove this.

Special classes:

- ≤ 6 vertices [DiBiase 1990]
- pyramid = convex hull (convex polygon + point)

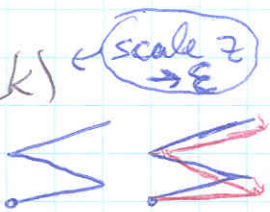
- prism = convex hull (convex polygon + parallel offset)

- prismoid = convex hull (convex polygon + parallel equiangular polygon) [O'Rourke 2001]
  - a volcano unfolding works



- dome = convex polygon (base) + polygons sharing edge with base [O'Rourke]

OPEN: edge unfold prismatoids = convex hull (two convex parallel polygons)

OPEN: edge unfold convex terrains (project w/o intersection) $\Rightarrow$ carry self-stress...

OPEN: edge unfold "almost flat" (infinitesimally thick) convex terrain or polyhedron