

Greg Price: Seam forms [arxiv:0711.2605](https://arxiv.org/abs/0711.2605) **THEORY**

- pita form: [Demaine & O'Rourke 2007]
 - smooth convex shape sewn up with one seam
- D-form: [Wills 2001]
 - two smooth convex shapes with equal perimeter sewn up with one seam
- past conjectures:
 - ① pita forms have no interior creases [D&O'R 2007]
 - ② D-forms have no interior creases } [Pottman & Wallner 2001]
 - ③ D-form = convex hull of seams }
- new results:
 - ① FALSE (but only one crease)
 - ② TRUE
 - ③ TRUE, also for pita forms
- generalization to "seam forms": convex surface flat except for some disjoint open/closed seams

Aviv Ovadya: Orthogonal origami **THEORY**

- box pleating: all creases on $90^\circ/45^\circ$ grid
- goal: orthogonal polyhedra
- disallow overhang ("supported polyhedra")
- result: can make anything in poly. time & grid
- mango polyhedra: towers glued to common plane
- $O(nmh^2)$ grid area where $h = \text{max height}$ & $m \times n$ target grid

Katherine Romer: simple strip folding THEORY

- given rectangular strip with noncrossing creases
- can it fold flat by sequence of simple folds?
[posed by M. Demaine]
- result: weakly NP-hard
by reduction from Partition
- conjecture: pseudopolynomial

Joy Ebertz: tensegrities SCULPTURE

- motivated by Ken Snelson's sculptures
- followed Peter Leuroux's guide
- cube doesn't stand: no equilibrium stress
- but nongeneric version works



Yoyo Zhou: $2 \times n$ map foldings

- given $m \times n$ map with mountain-valley pattern, decide whether it folds flat
- polynomial or NP-complete? [Edmonds 1997]
- here focus on $m=2$
- 4 kinds of vertices by Maekawa's Theorem: different crease to North, South, West, or East
(up to global reversal) Left Right Out In
- top-edge representation: Left/Right strings are "tunnels"
[David Charlton]

- inside tunnels must match L/R turns outside but can be a refinement (add equal numbers of L's & R's at any point)
- but must also constrain non-self-intersection
- new representation: one segment with downward arrow labeled L or R

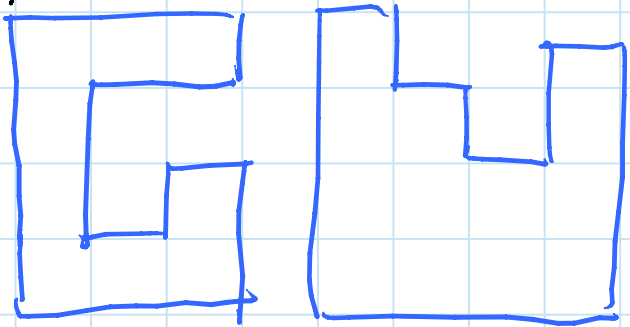
Yaa-Ling Tu: HP model

SURVEY

- extensions: other lattices, weighted vertices, local minima
- lattices: triangular [Poon & Thite 2006; Agarwala et al. 1997]
 hexagonal [Poon & Thite 2006] → uniqueness
 grid lattices with diagonals → approximation
 [Böckenhauer & Bongartz 2006]
- question 1: how well does the HP model predict structure like α -helix coiled coil?
- weightings: by hydrophobicity [Agarwala et al. 1997]
 by polar residues (P's)
 side chain size (big \leftrightarrow small?)
 ...
- question 2: how do vertex weights affect percentage of unique foldings?
 (cf. exhaustive study of Aichholzer et al.)
- local minima an issue in practice
- question 3: what is likelihood of given HP protein of length n folding into min. energy state?
 (vs. local minimum ~ some possible definitions)

Andrea Hawksley, Shelly Manber, Omari Stephens:

- simple fold & cut (with others from problem session)
- characterization of simply foldable single-vertex crease patterns for some-layers:
 - \Leftrightarrow crease line of symmetry
- tool: arbitrary scaling by crimps but must preserve relative x,y orders
- new results:
 - convex polygons with line of symmetry doable
 - isosceles triangle doable, but nonisosceles triangle not
 - xy-monotone orthogonal polygons doable
- conjectured impossible:
 - + artistic examples



Simon Kim:

- actuated mesh surface
- change surface on GUI
- \Leftrightarrow change physical surface

