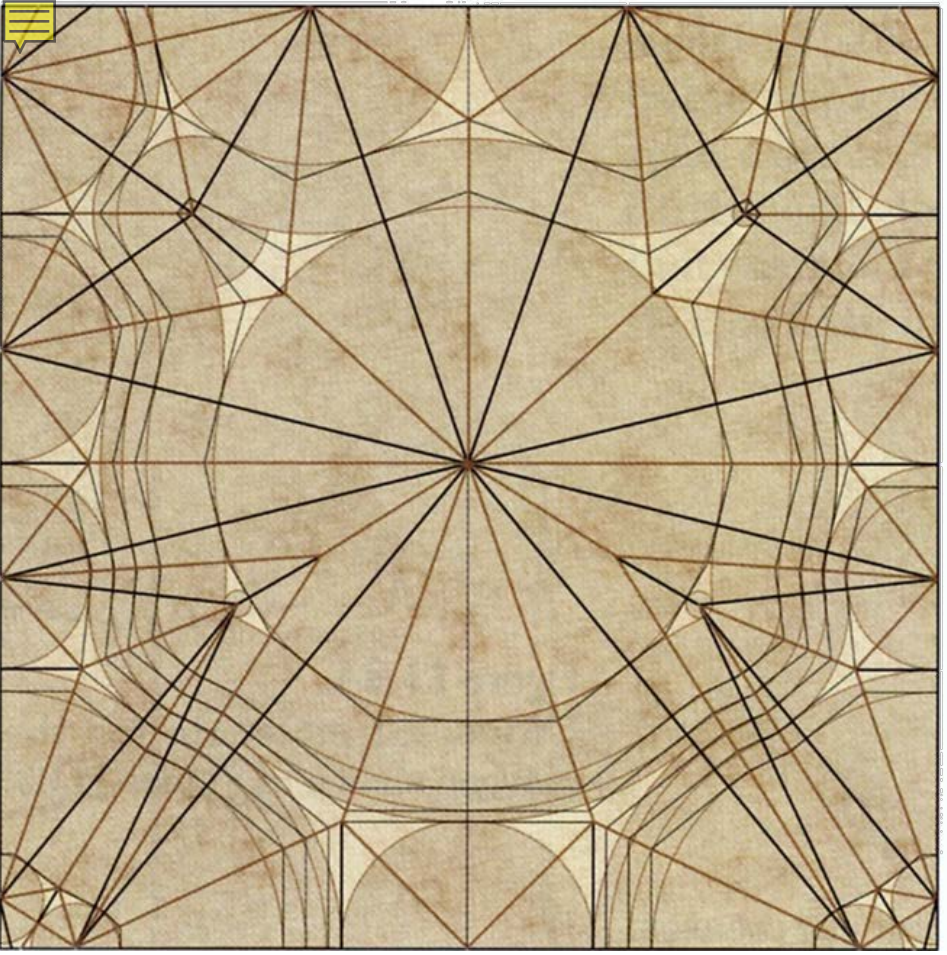
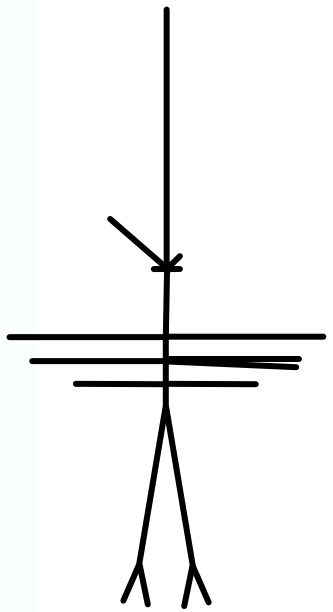
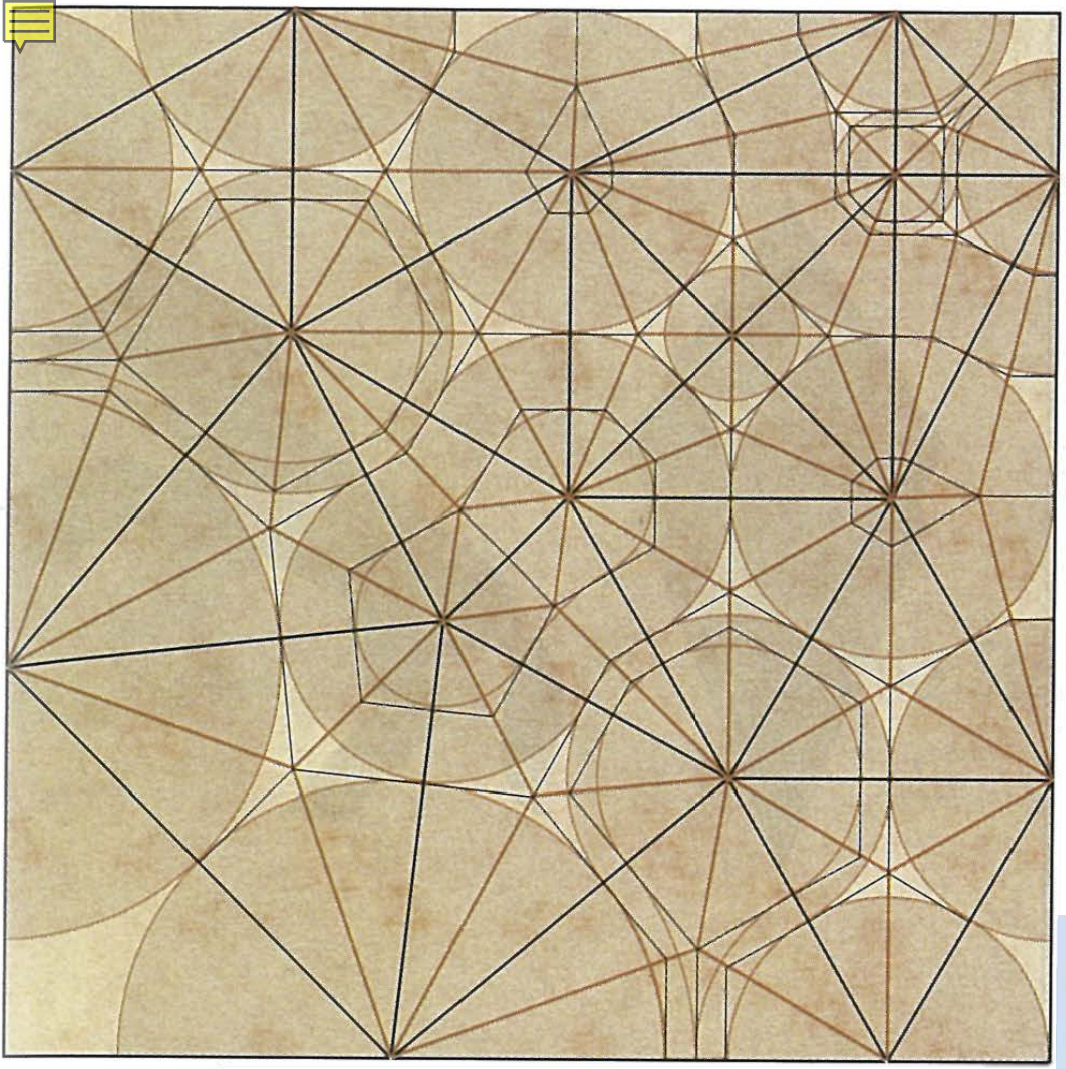
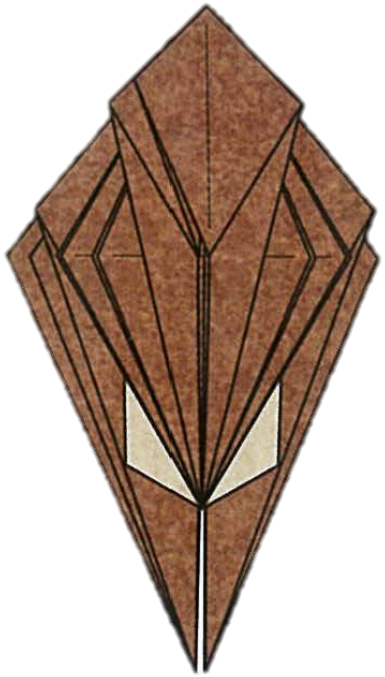
It's not clear to me that all of the examples (nazgul, scorpion, shrimp, etc.) are uniaxial.
At least they don't seem to be.
But I thought the algorithm you were describing worked only for uniaxial origamis?

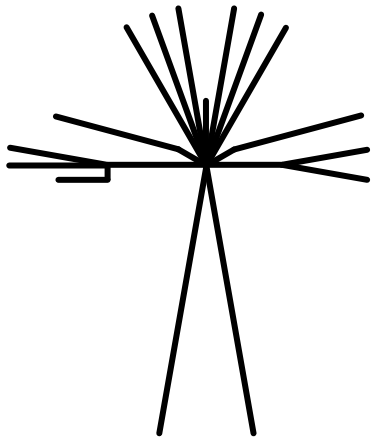




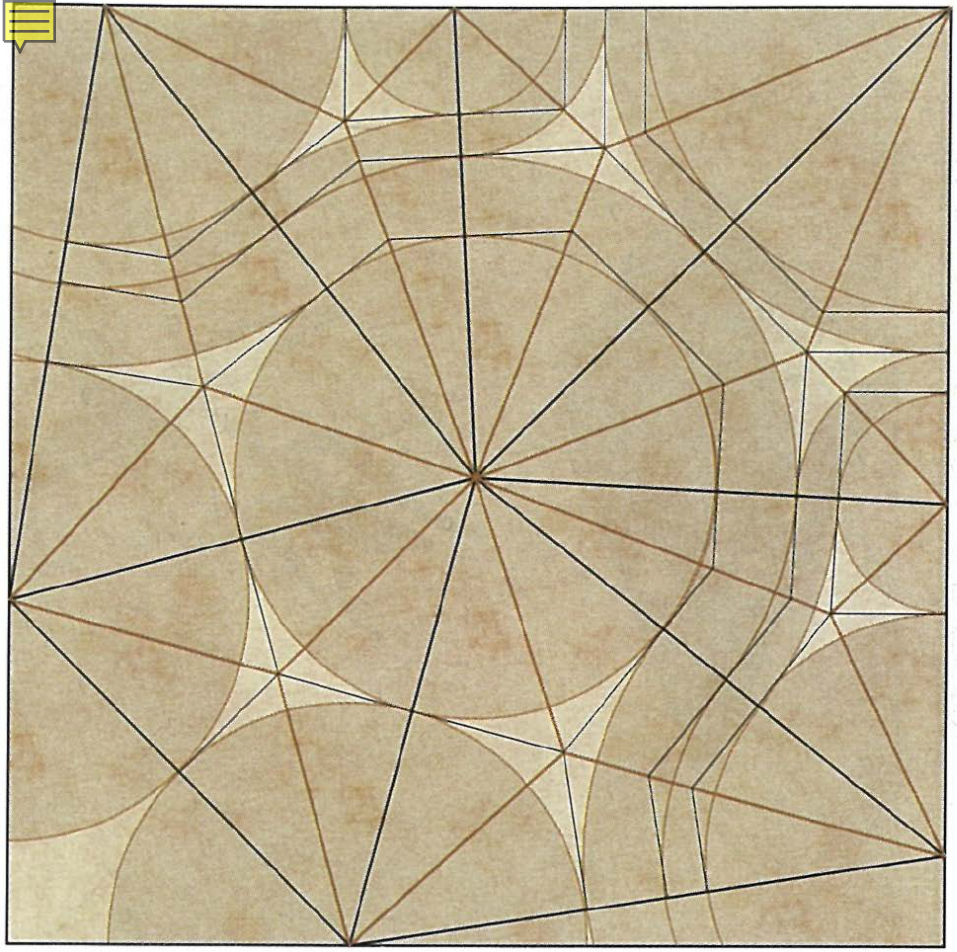
"Scorpion varileg, opus 379"
Robert Lang, 2002

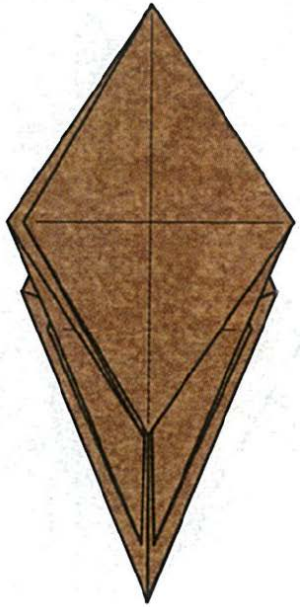


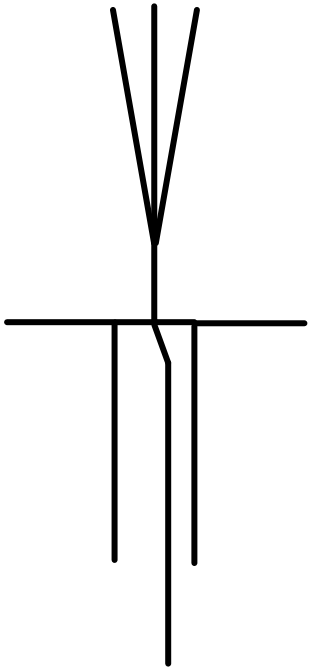




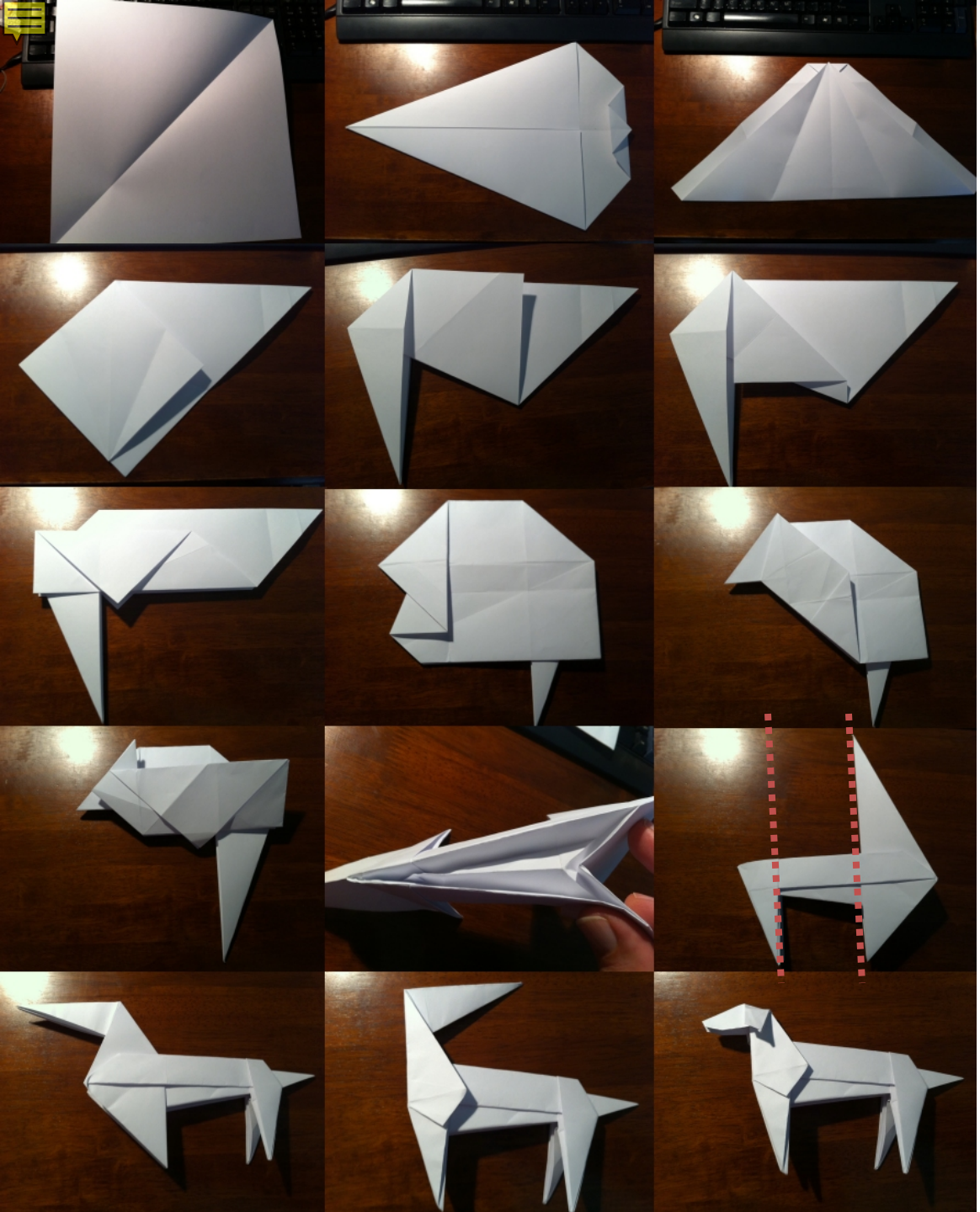
"Flying Grasshopper, opus 382"
Robert Lang, 2003





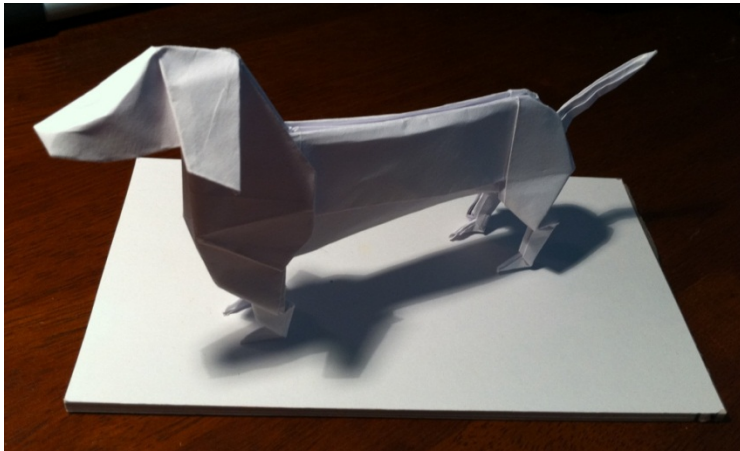


"Alamo Stallion, opus 384"
Robert Lang, 2002

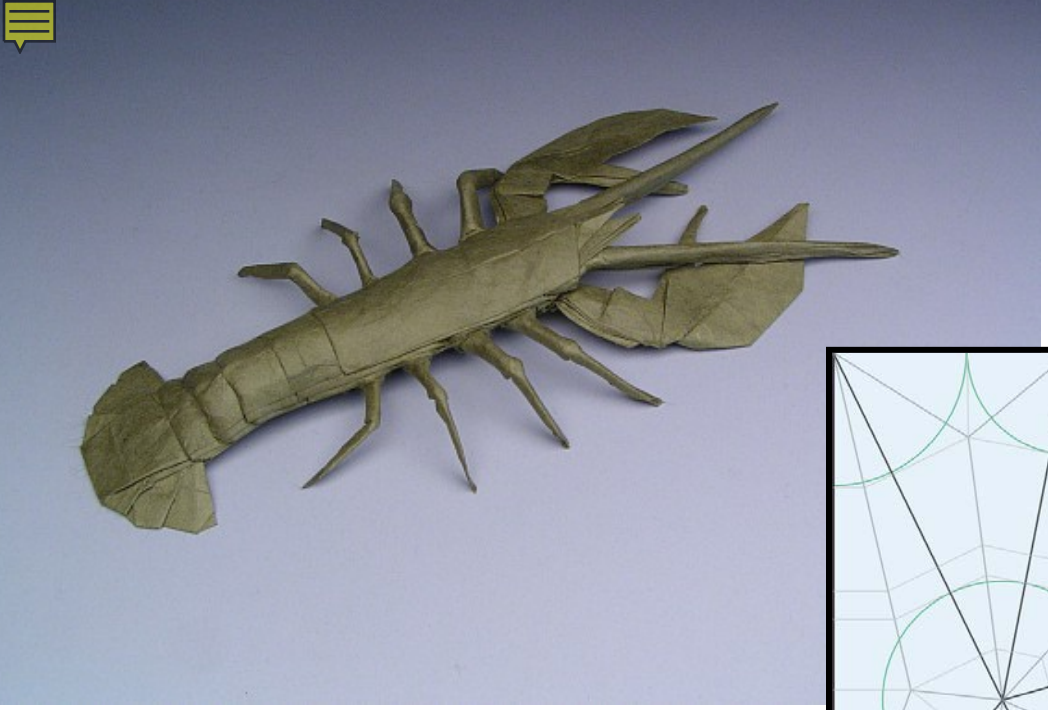


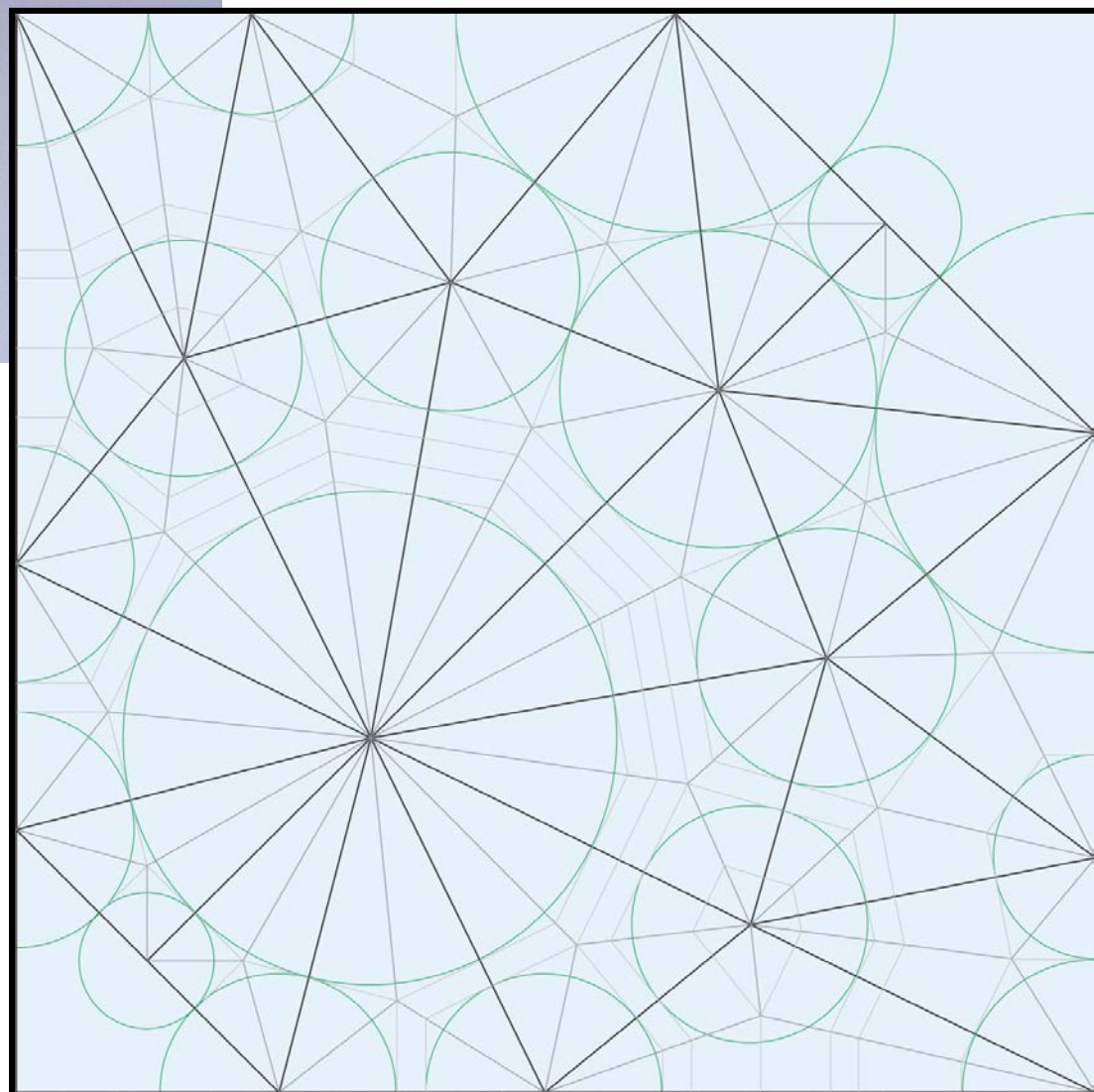
John Montroll's
"Dog Base"
&
"Sausage Dog"

folded by
Wonko, 2011

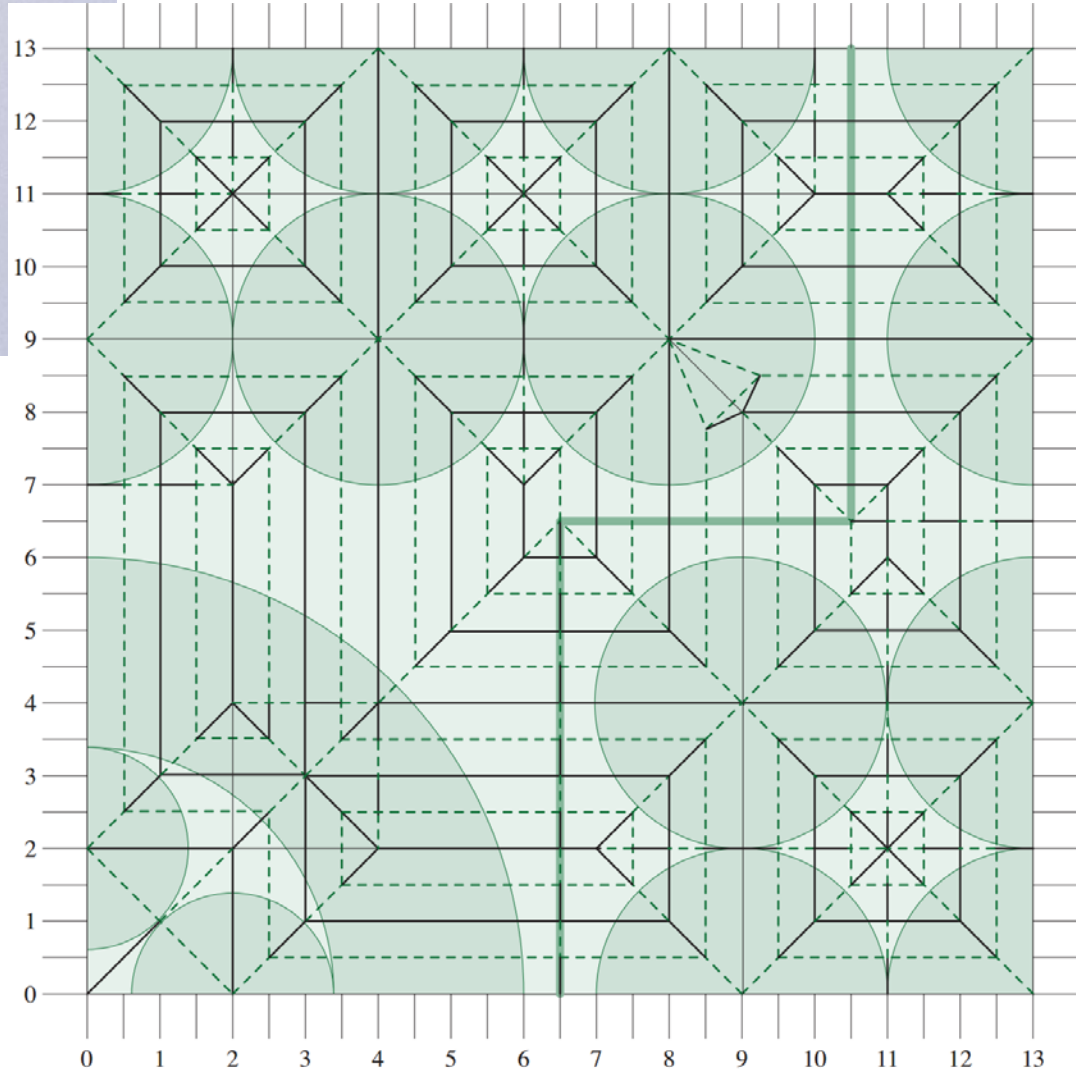


How often is TreeMaker or Origamizer used in practice? What techniques are most commonly used for origami design?

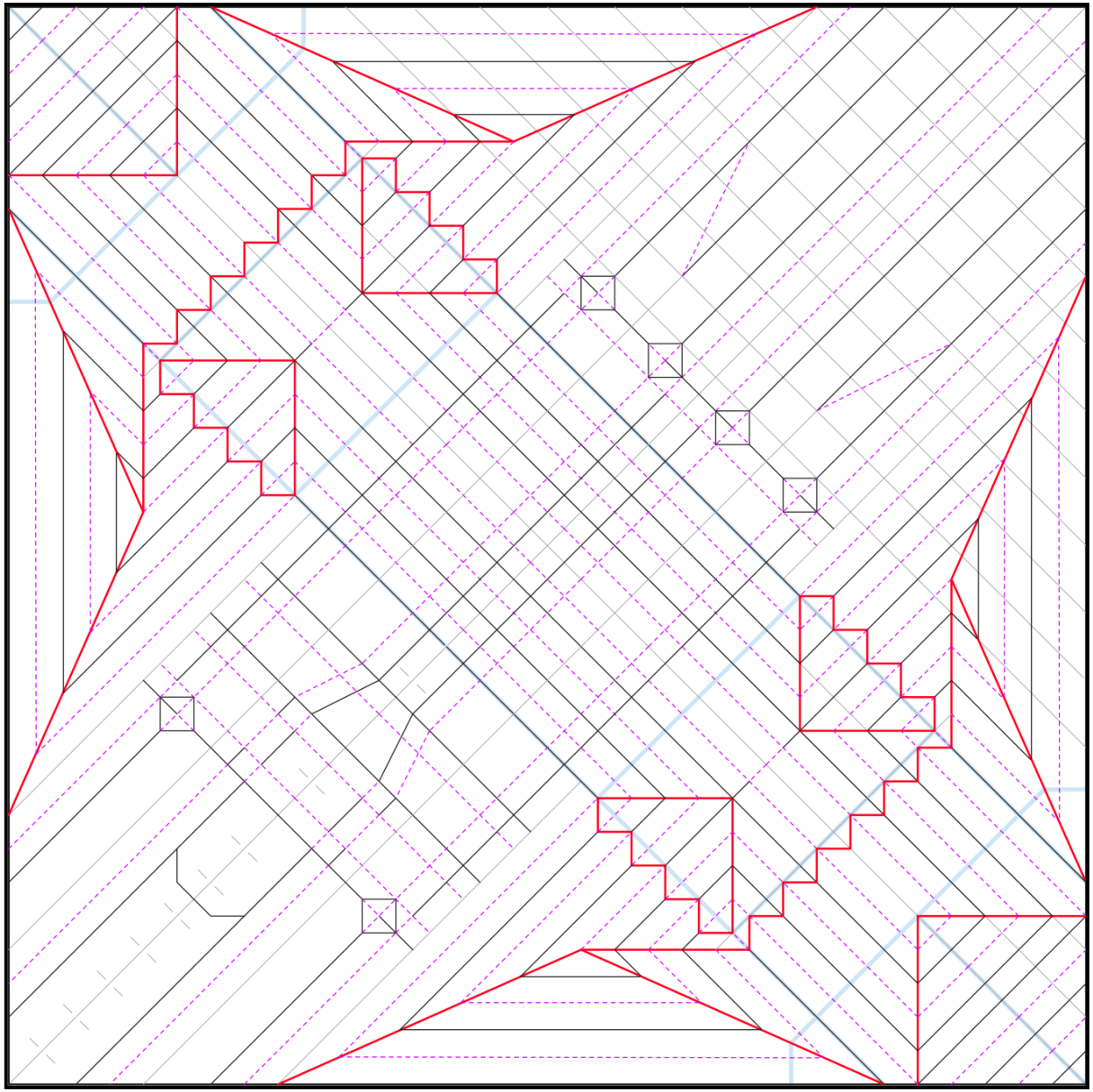




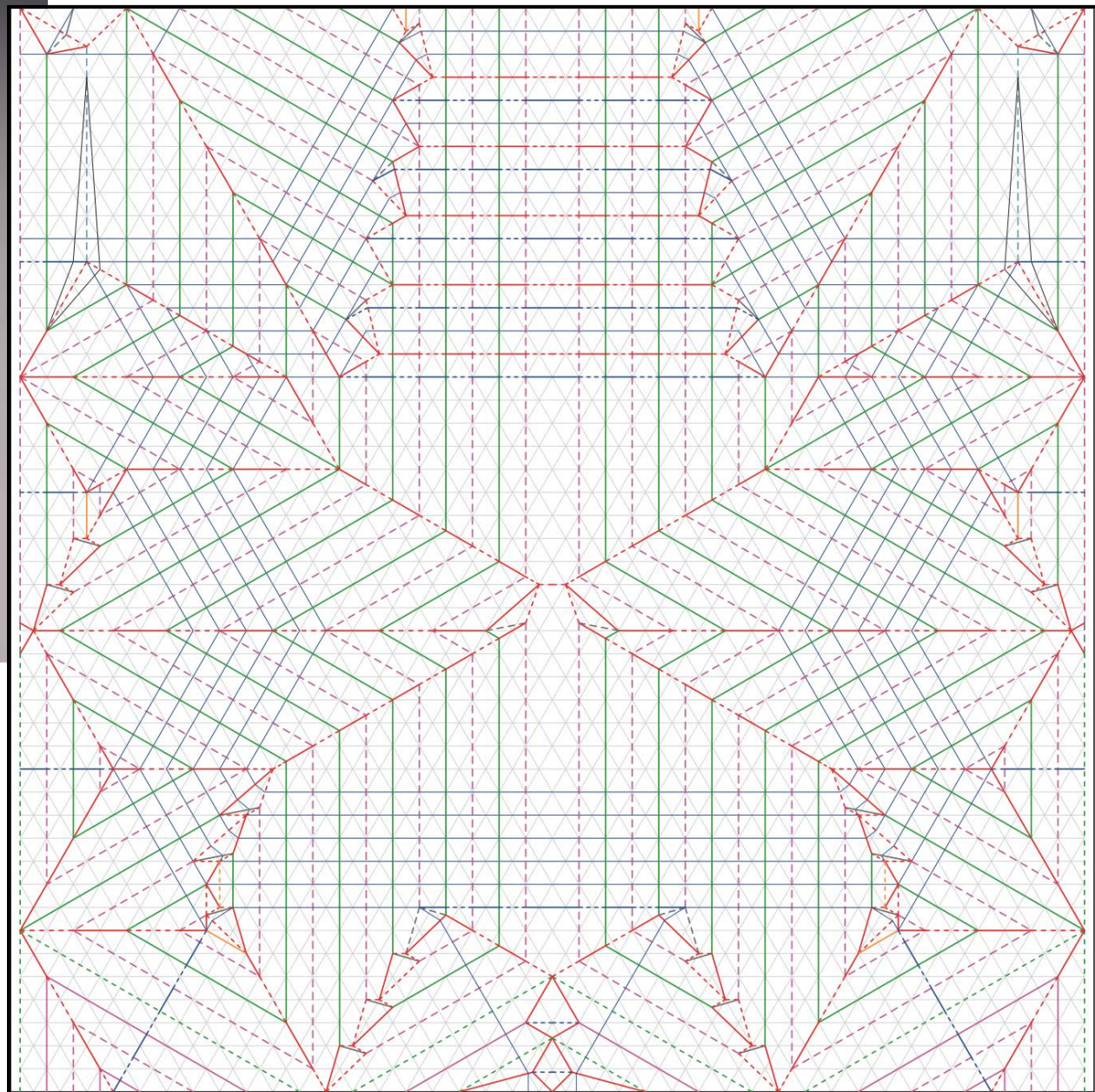
“Maine Lobster, opus 447”
Robert Lang, 2004



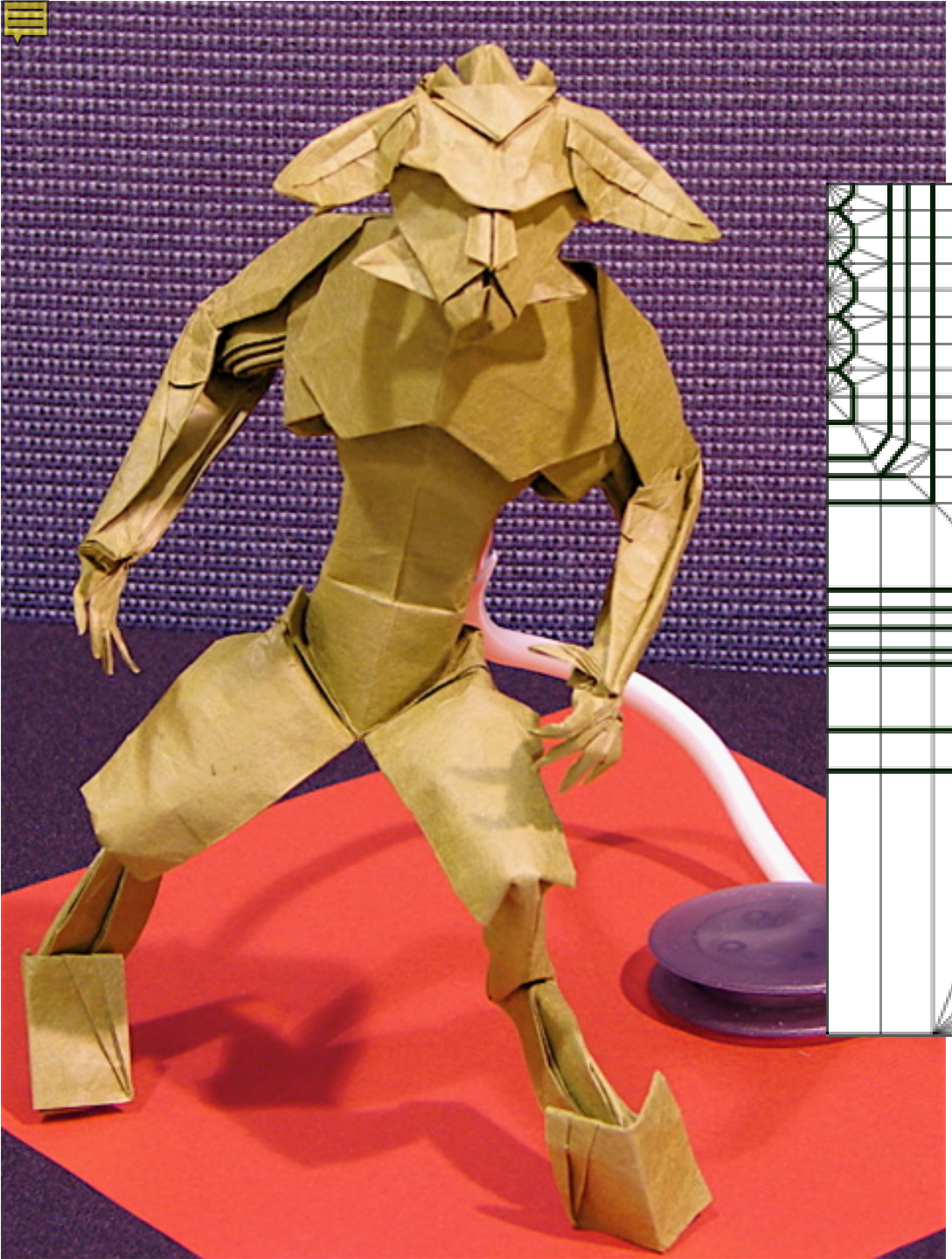
“Fiddler Crab, opus 446”
Robert Lang, 2004

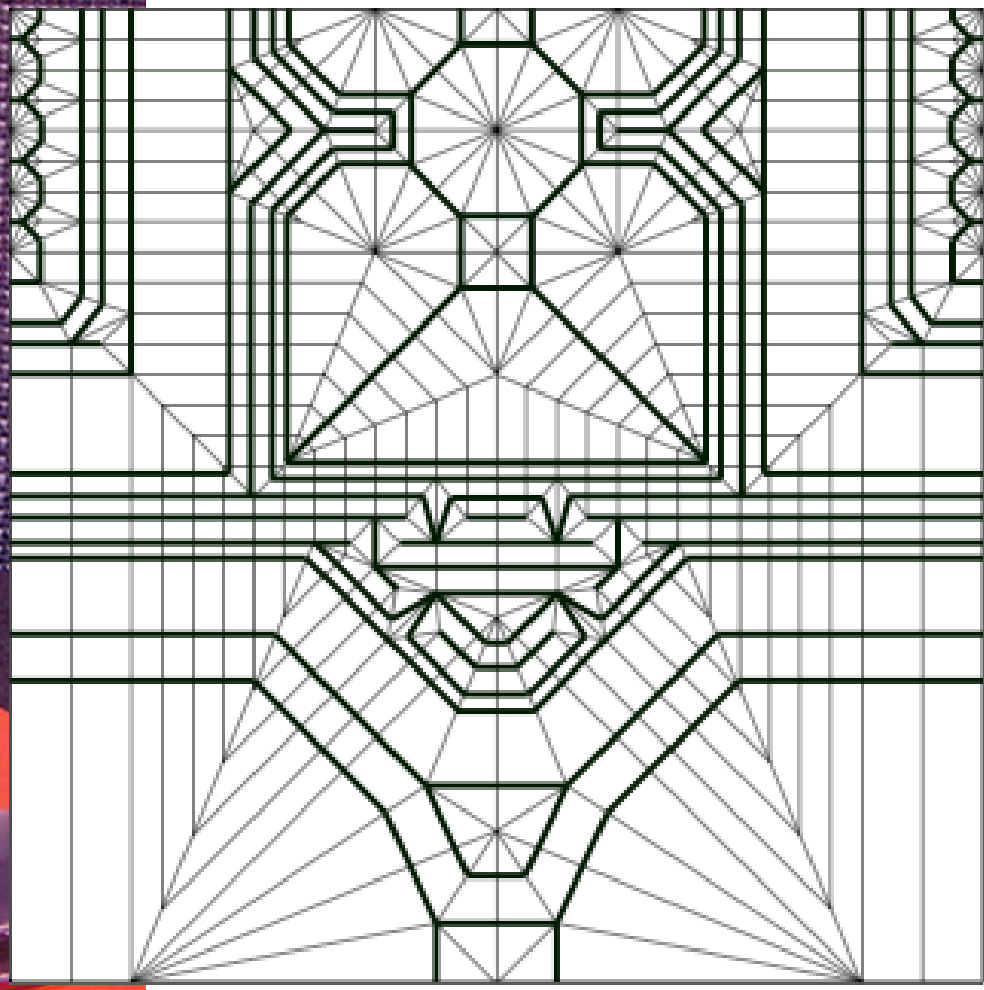


"C. P. Snow, opus 612"
Robert Lang, 2009

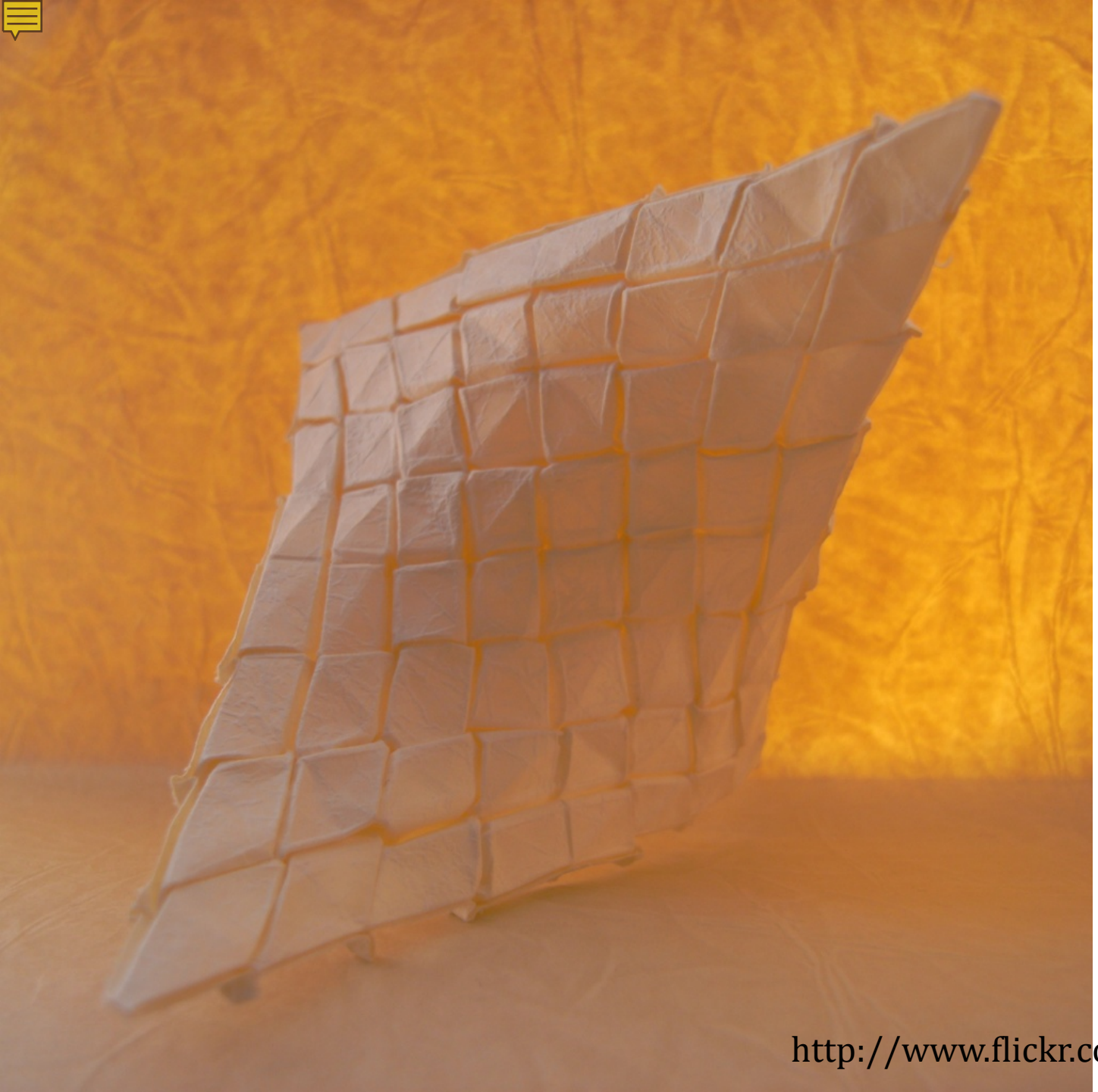


"Emperor Scorpion,
opus 593"
Robert Lang, 2011



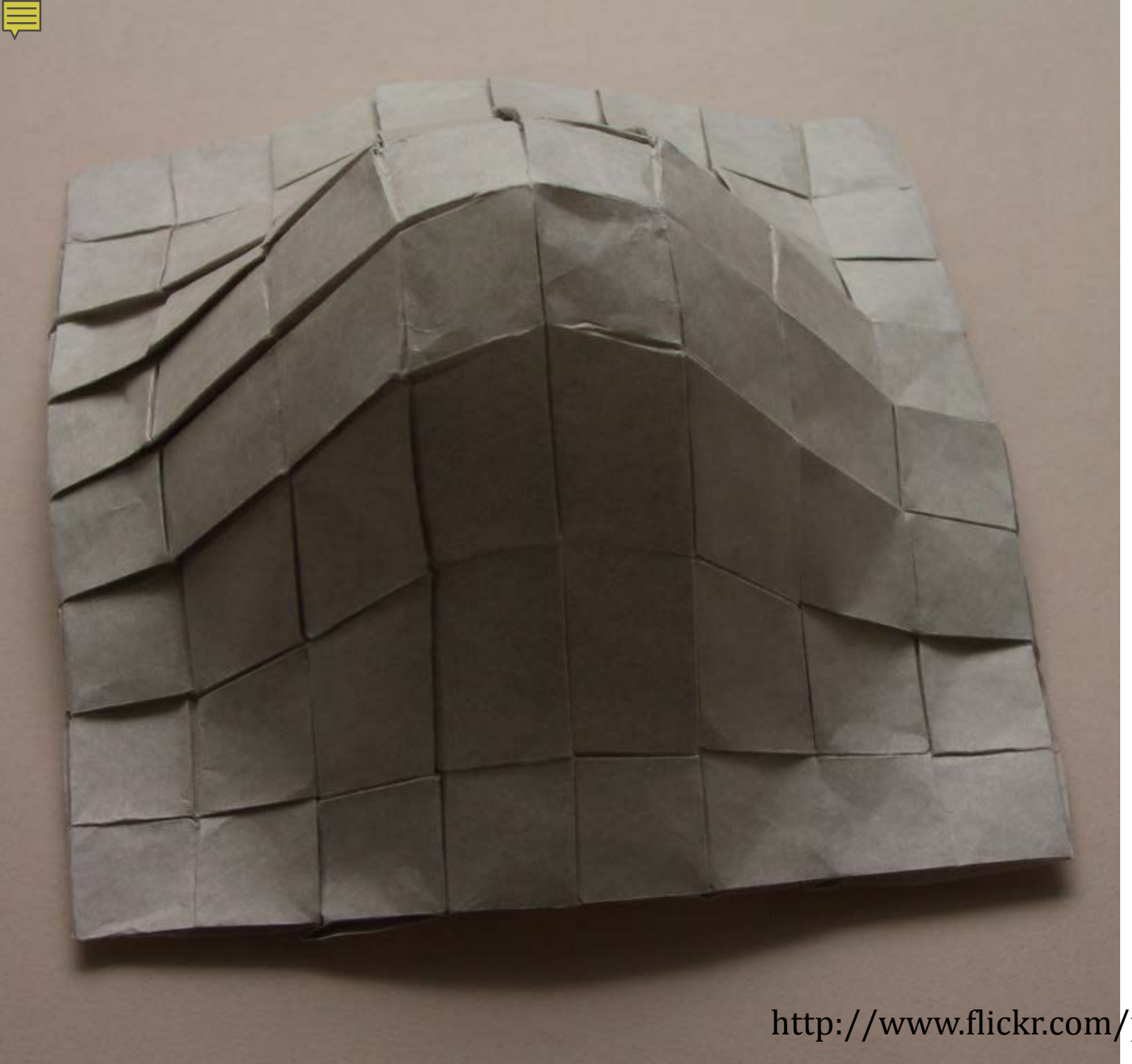


"Pan 1.6"
Jason Ku, 2007



“tessellated hypar”
Tomohiro Tachi
2007

http://www.flickr.com/photos/tactom/

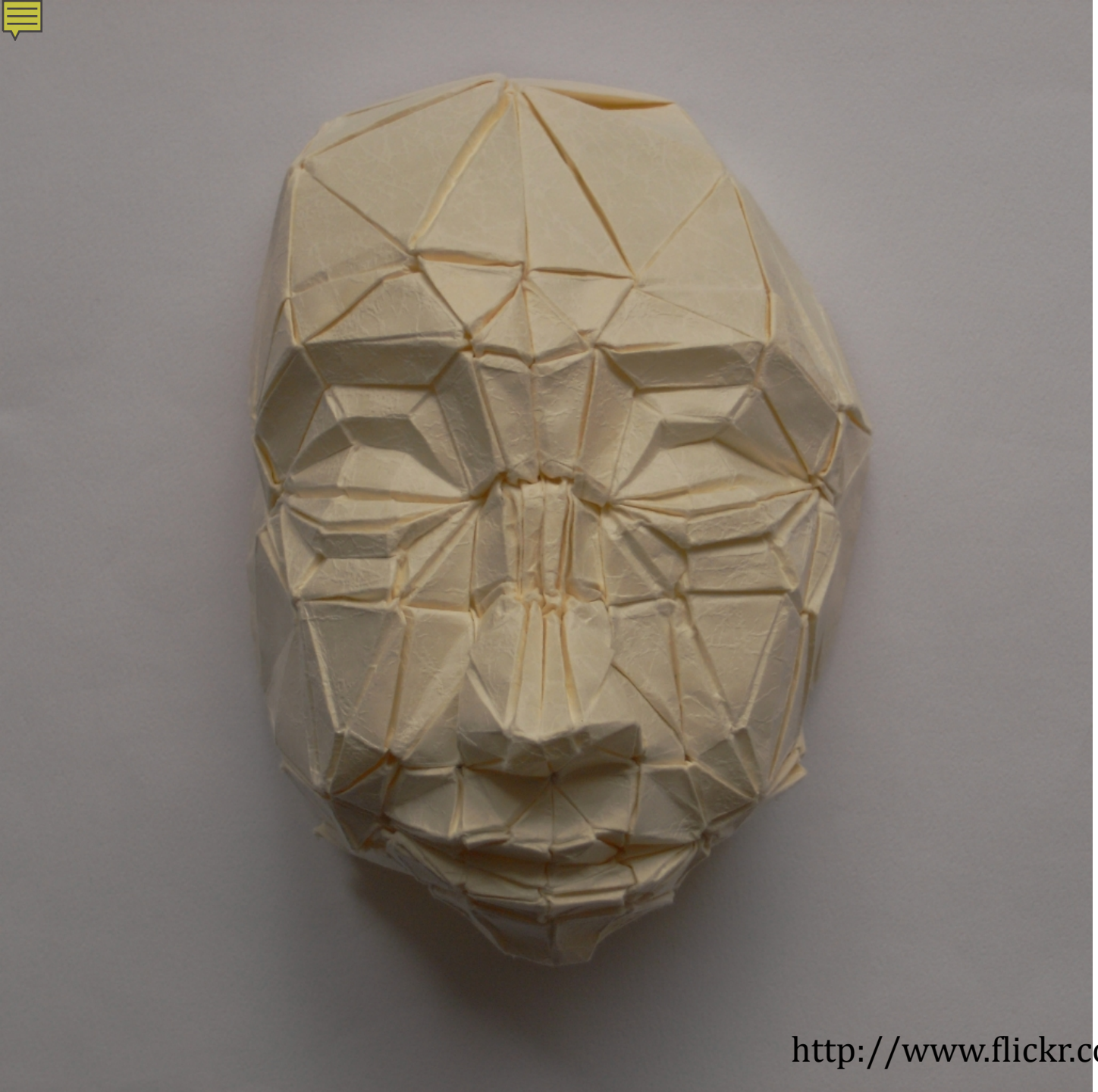


"3D origami
bell shape"
Tomohiro Tachi
2007

http://www.flickr.com/photos/tactom/

"Mouse"
Tomohiro Tachi
2007

http://www.flickr.com/photos/tactom/



"3D mask"
Tomohiro Tachi
2007

http://www.flickr.com/photos/tactom/

“Tetrapod”
Tomohiro Tachi
2008

http://www.flickr.com/photos/tactom/

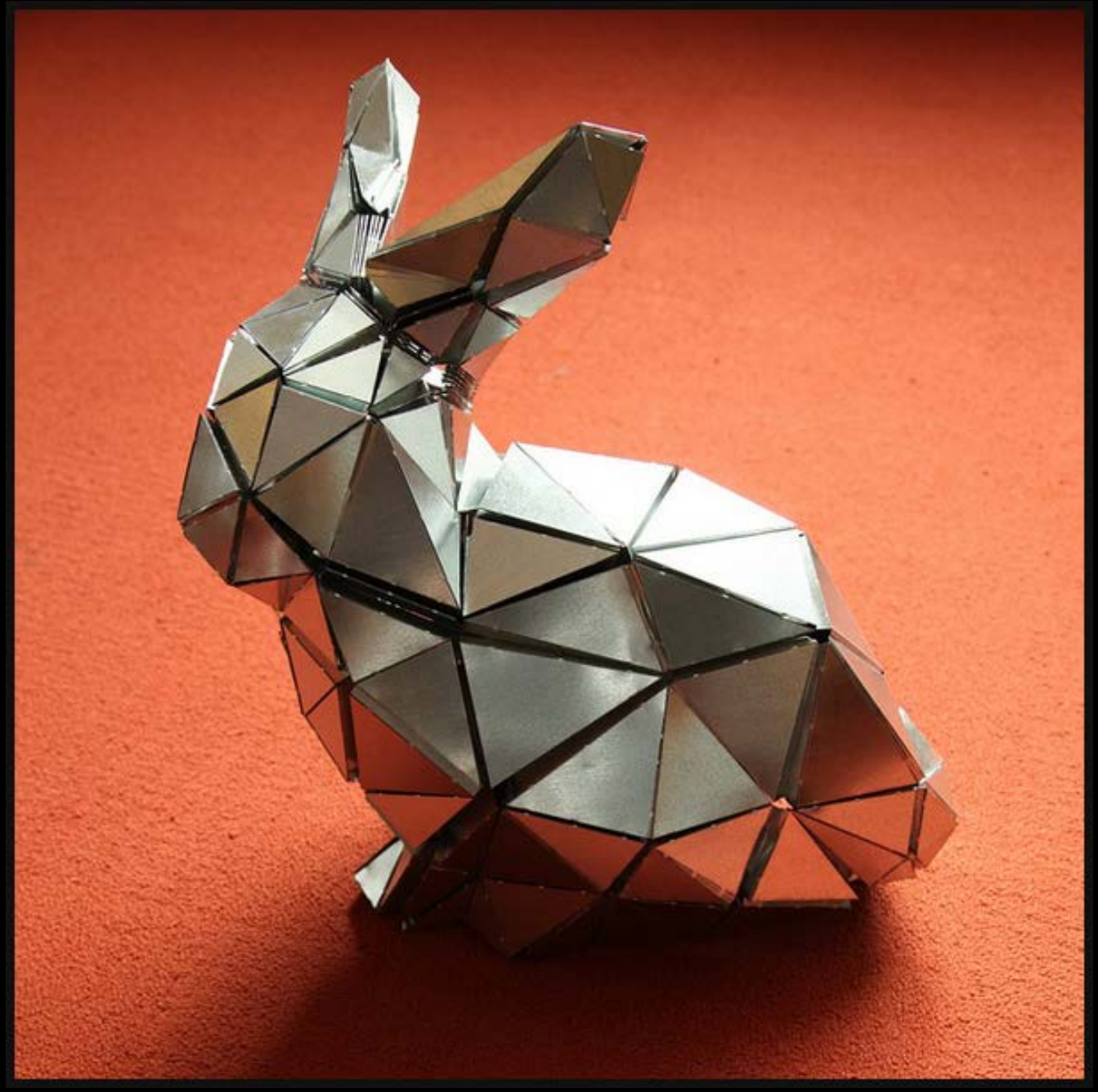
"Leaf of Kajinoki (Broussonetia Papyrifera)"
Tomohiro Tachi
2007

http://www.flickr.com/photos/tactom/

"Origami
Stanford
Bunny"
Tomohiro Tachi
2007

http://www.flickr.com/photos/tactom/

[Cheung, Demaine, Demaine, Tachi 2011]



[Cheung, Demaine, Demaine, Tachi 2011]

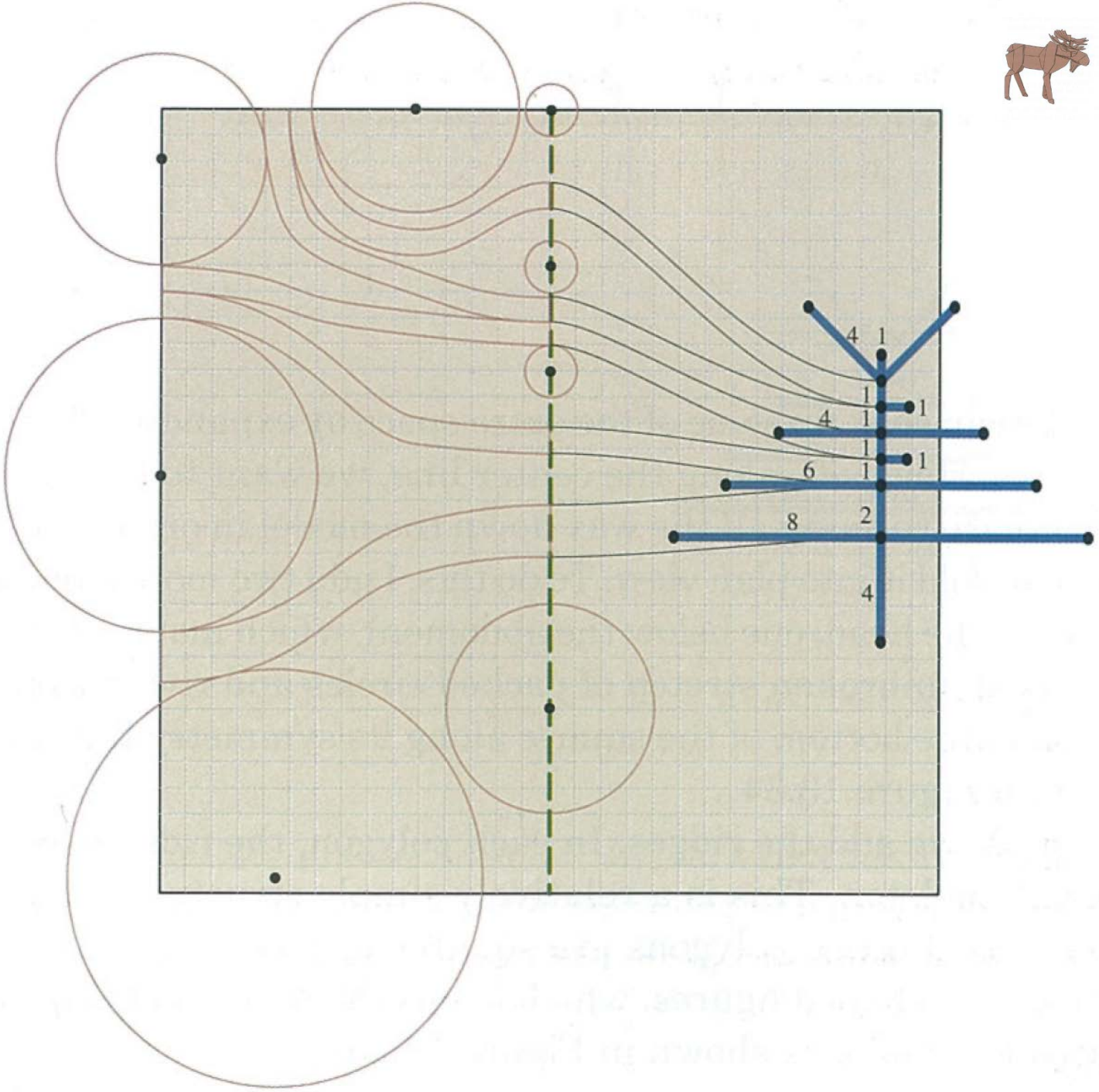
On boxpleating vs TreeMaker — is there something similar to TreeMaker for box pleating? Is the variety of trees that boxpleating can implement limited in some way?

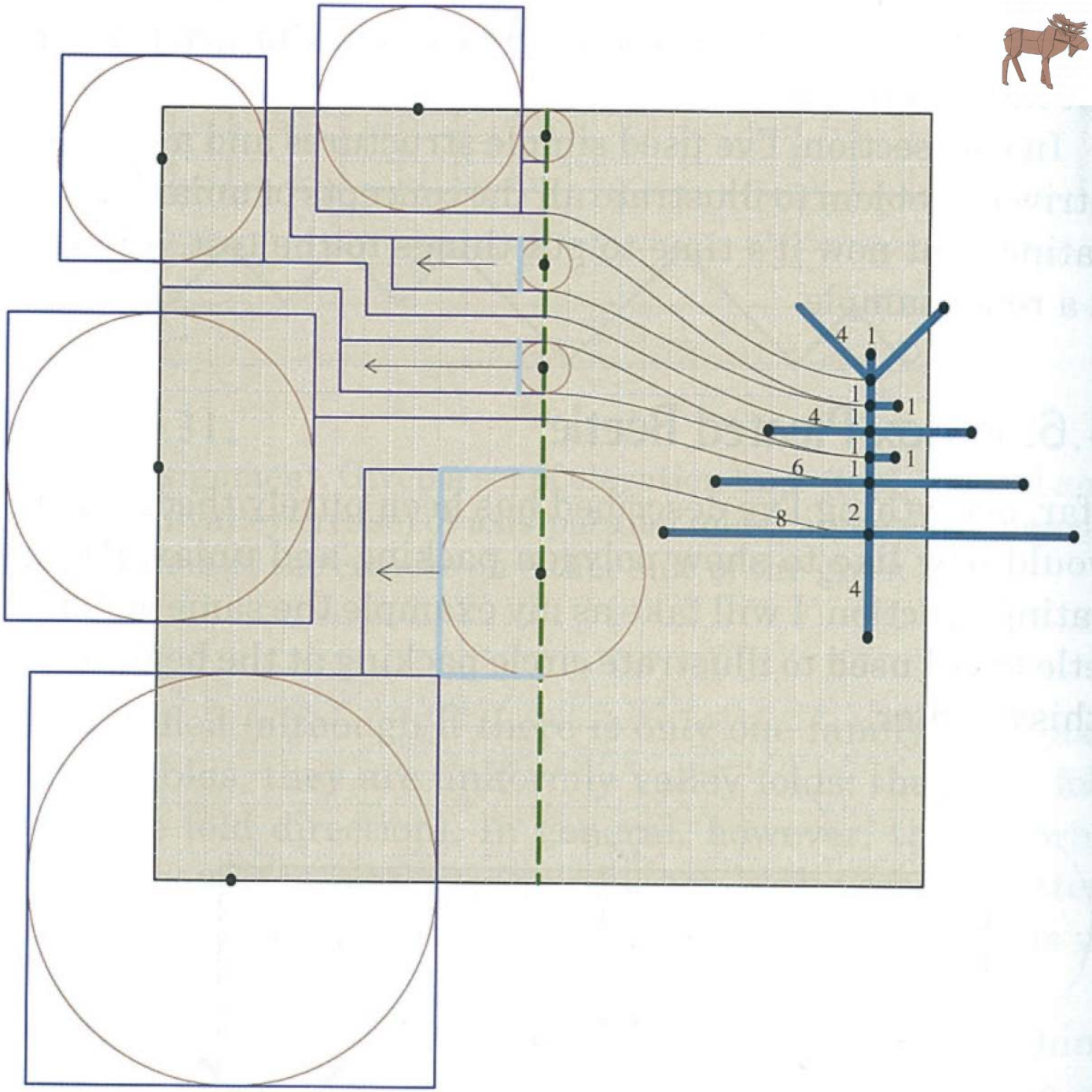
SECOND EDITION

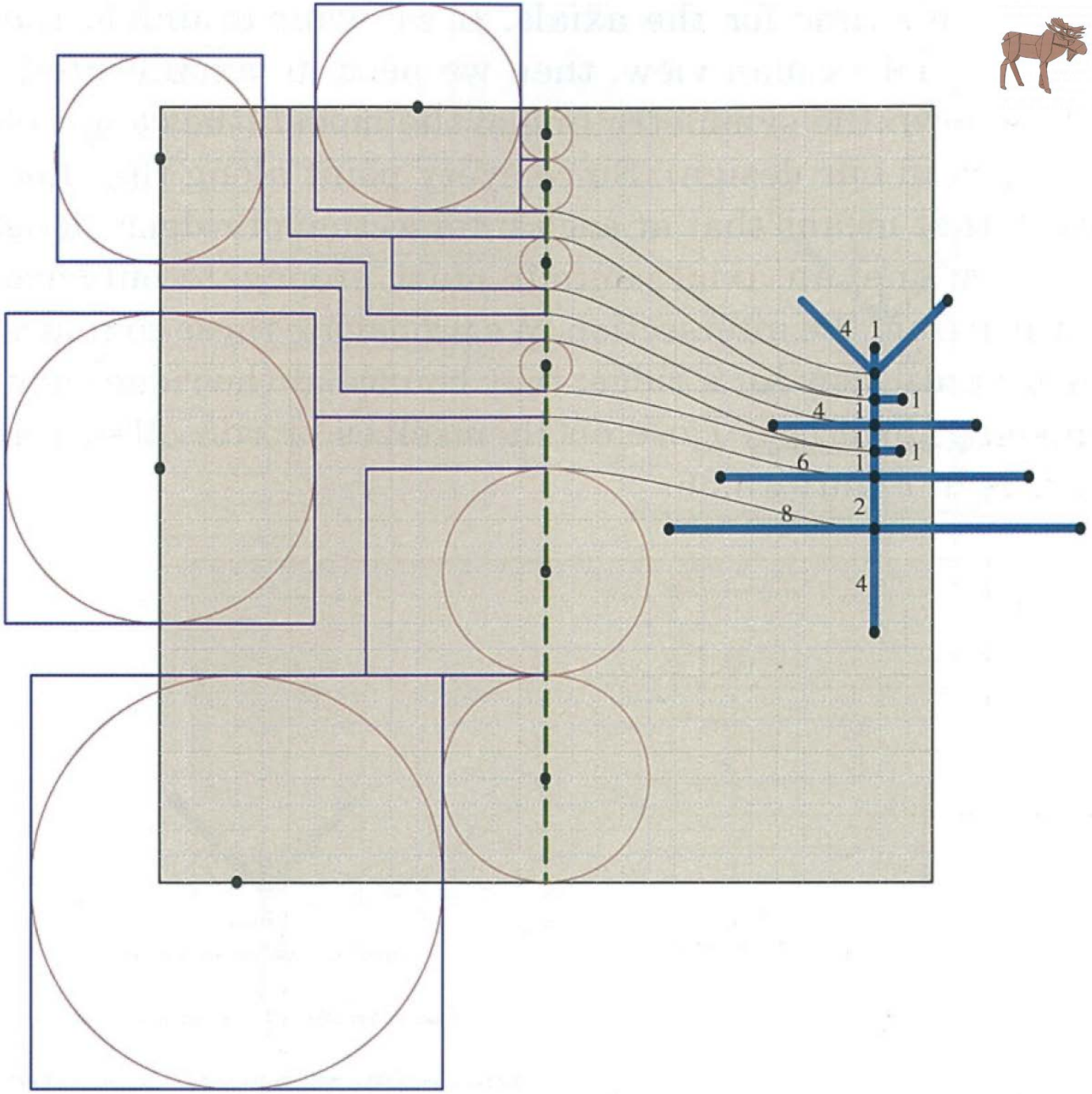
ORIGAMI DESIGN SECRETS

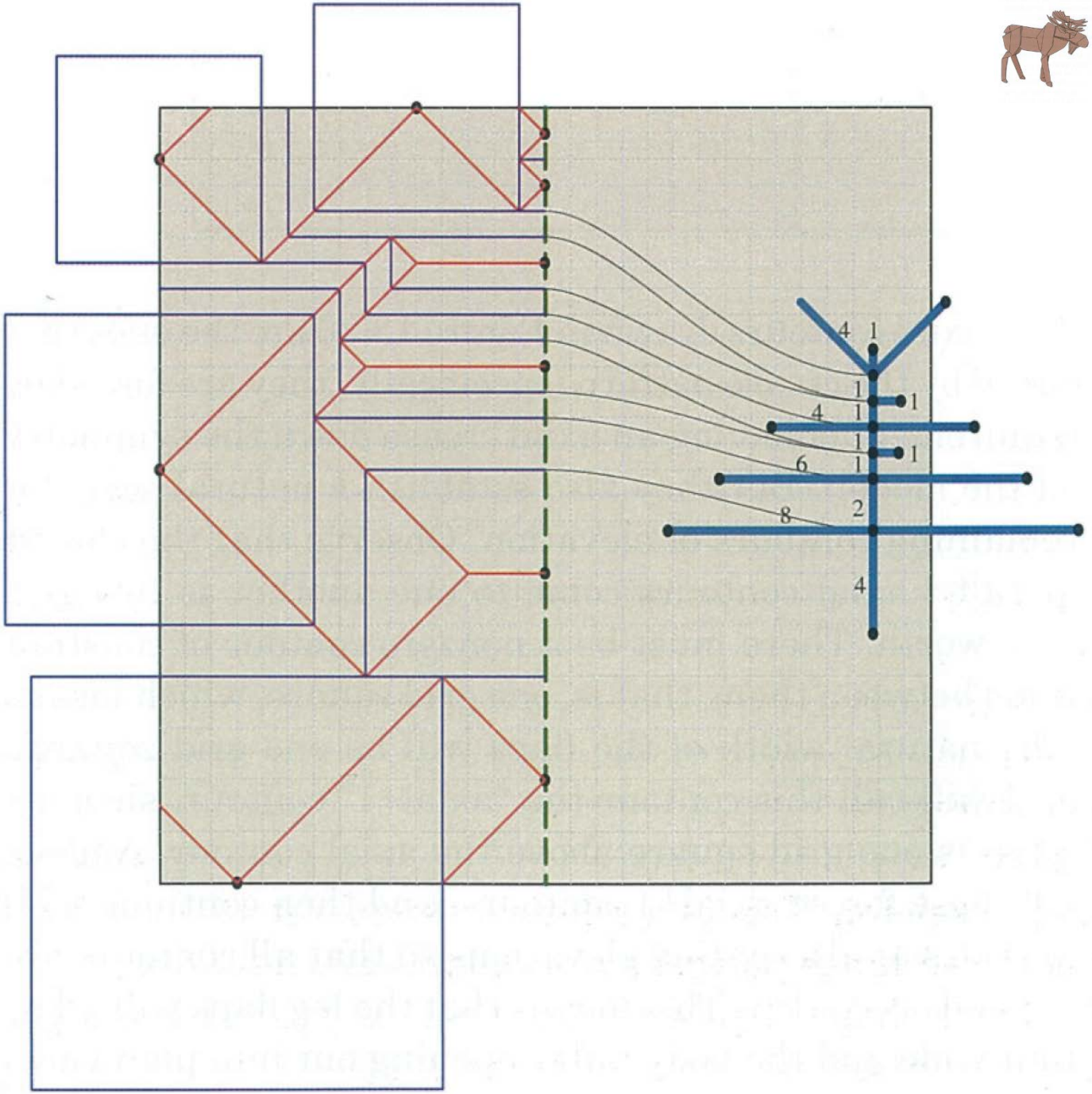
Mathematical Methods for an Ancient Art

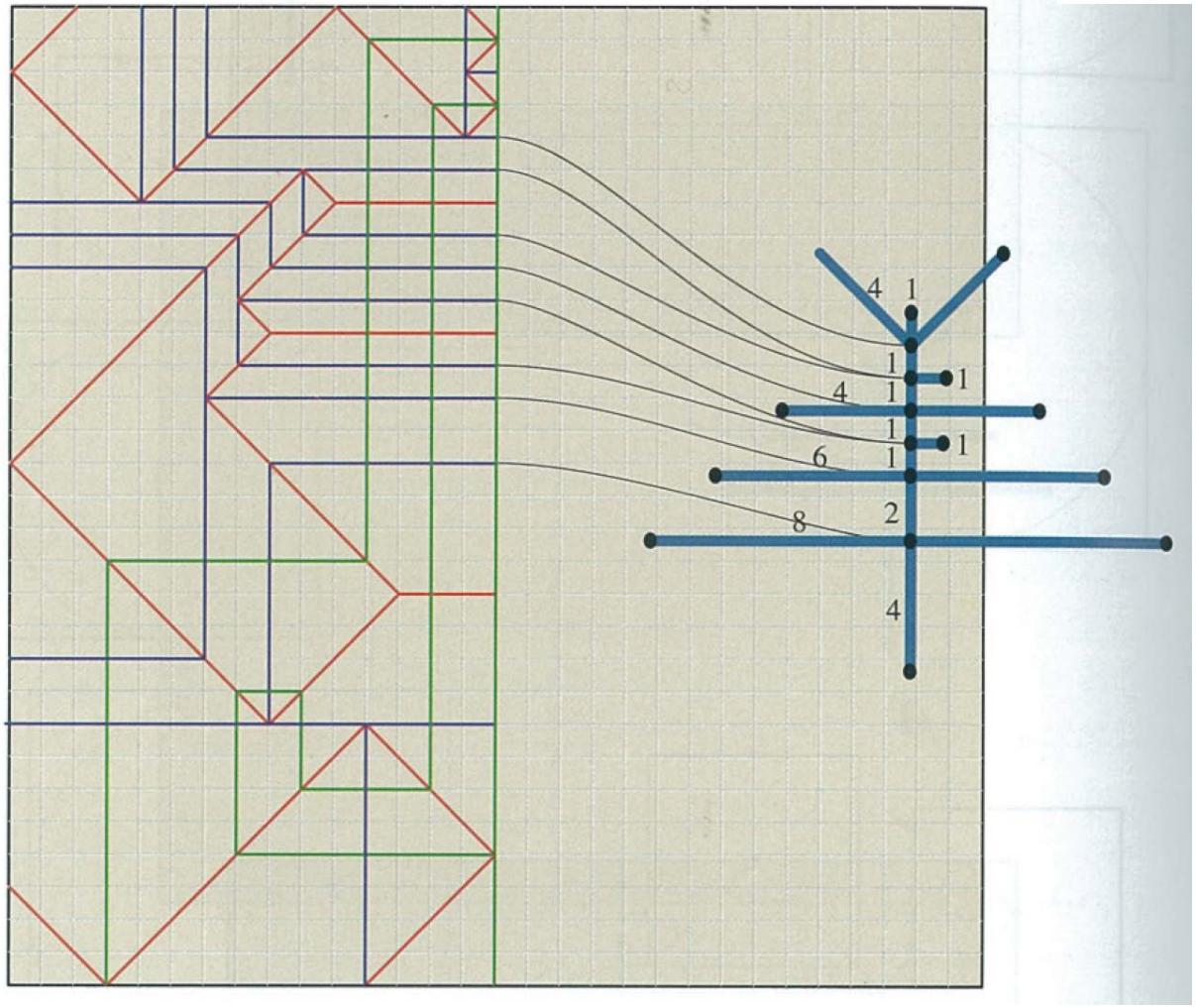
ROBERT J. LANG

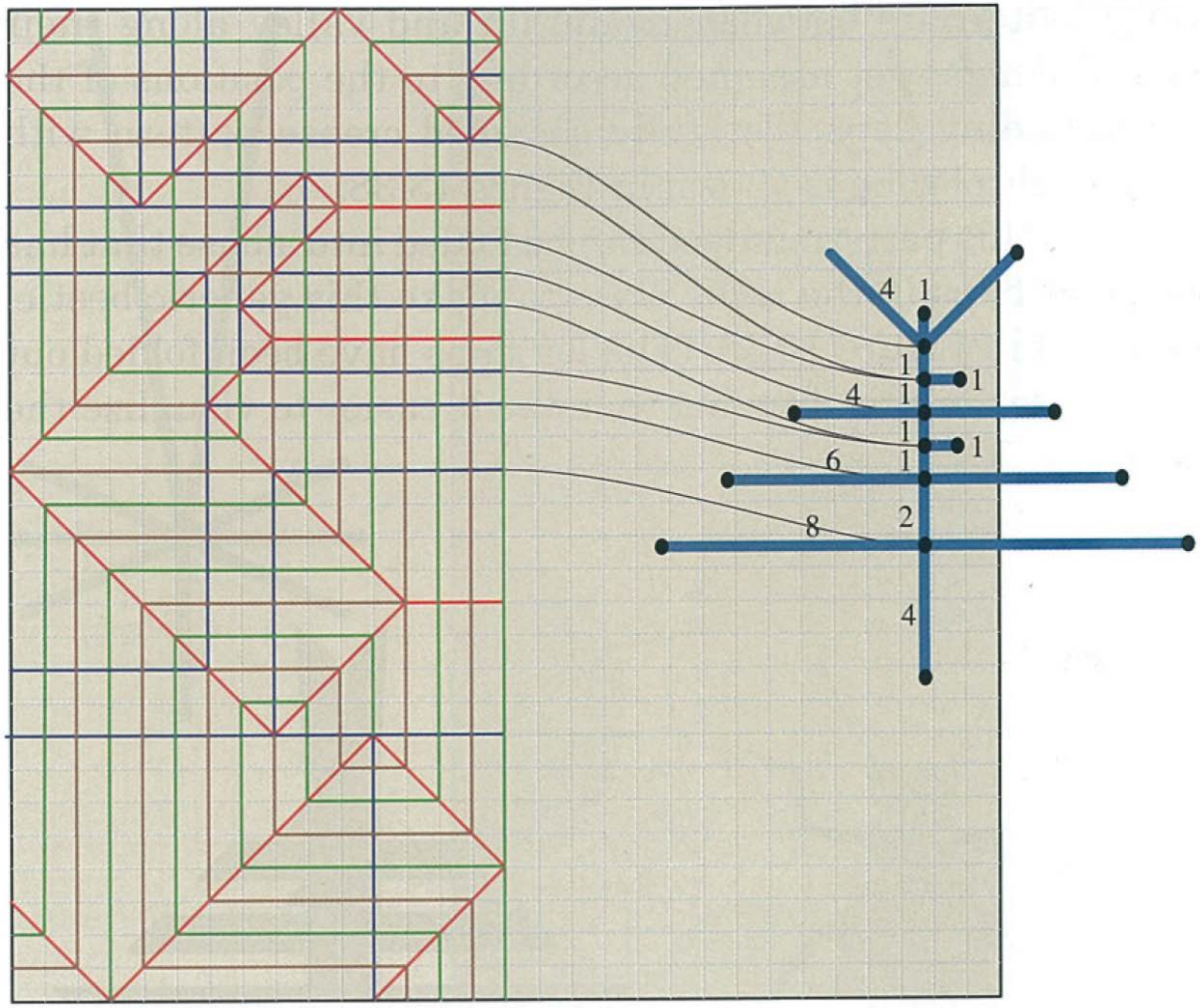

4 1
1
1
4 1
1
1
1
6 1
1
8 2
4

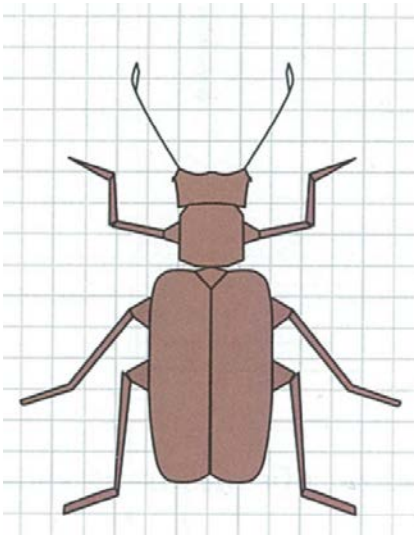

4
1
1
1
4
1
1
1
6
1
8
2
4

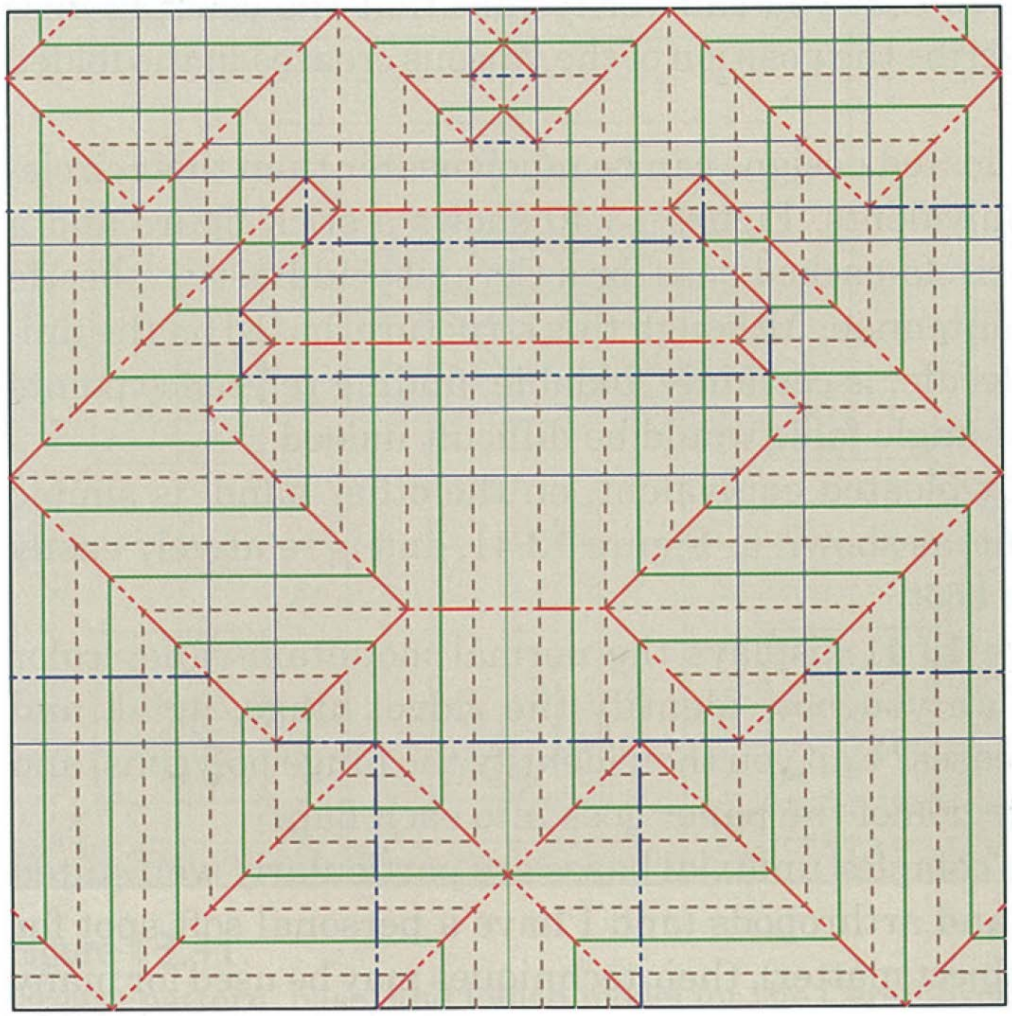

4
1
1
1
4
1
1
1
6
1
1
2
8
4

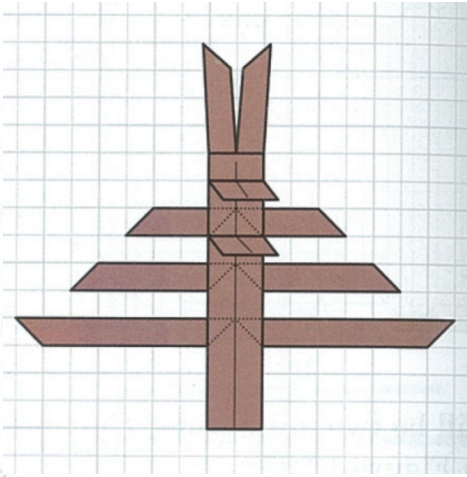

4
1
1
1
4
1
1
1
6
1
1
8
2
4


4
1
1
1
4
1
1
1
1
6
8
2
4

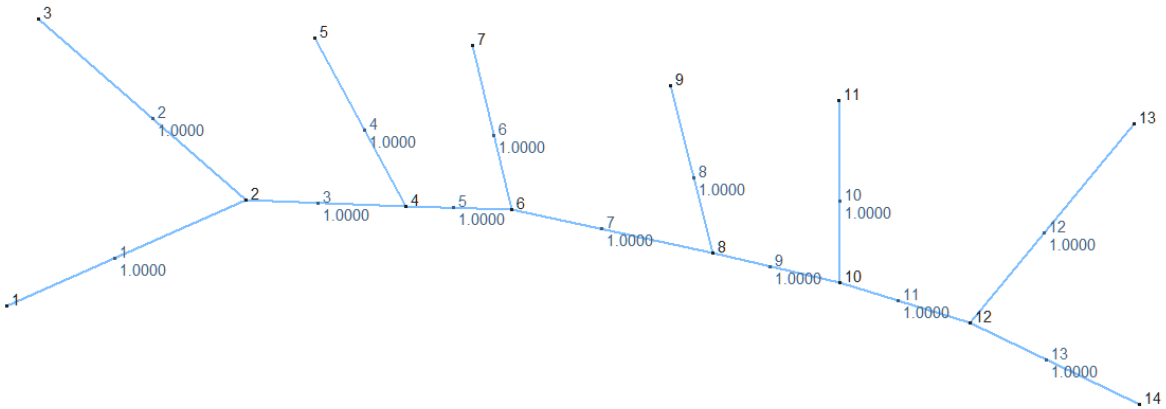

4
1
1
1
4
1
1
1
6
1
2
8
4

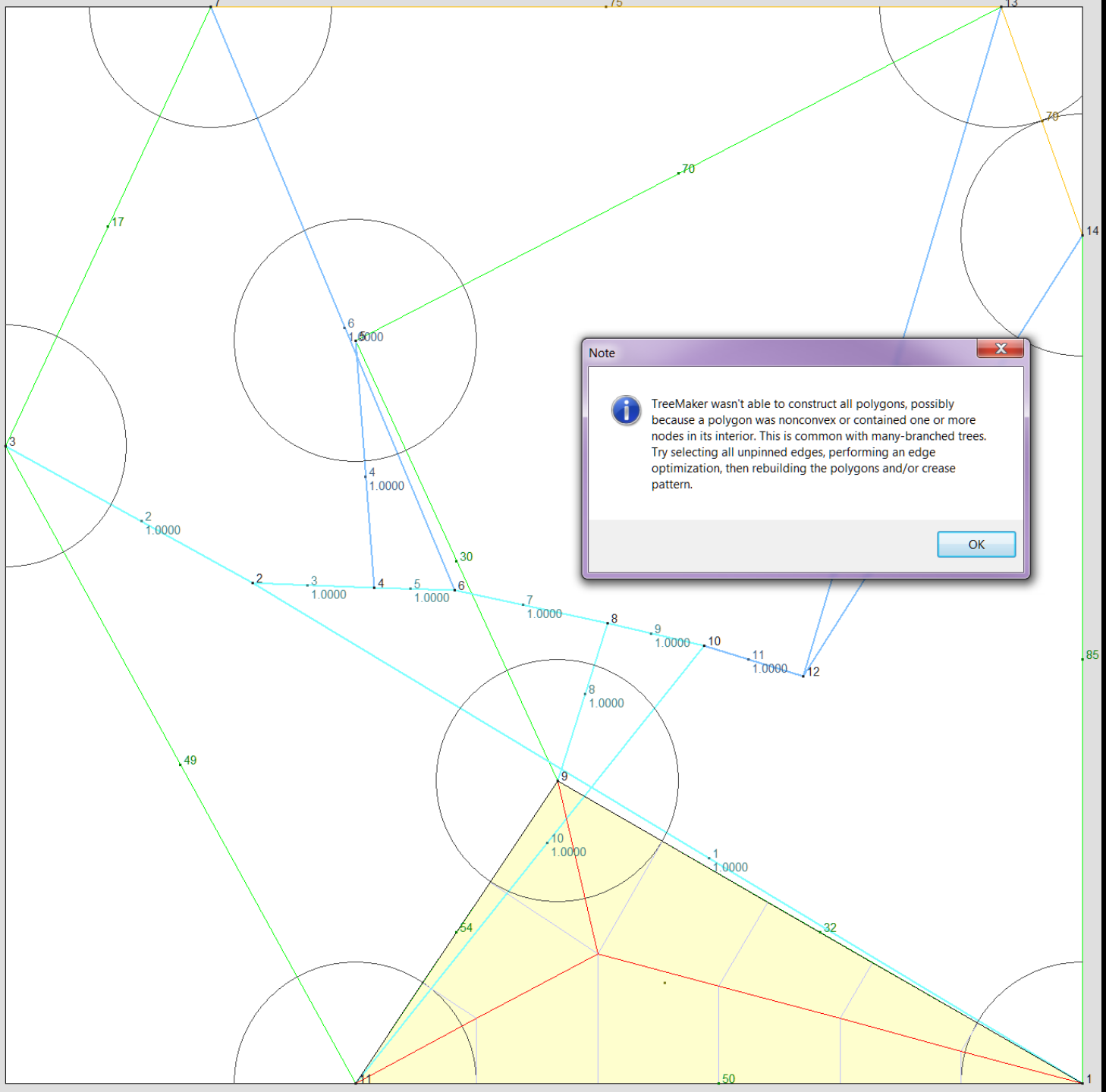


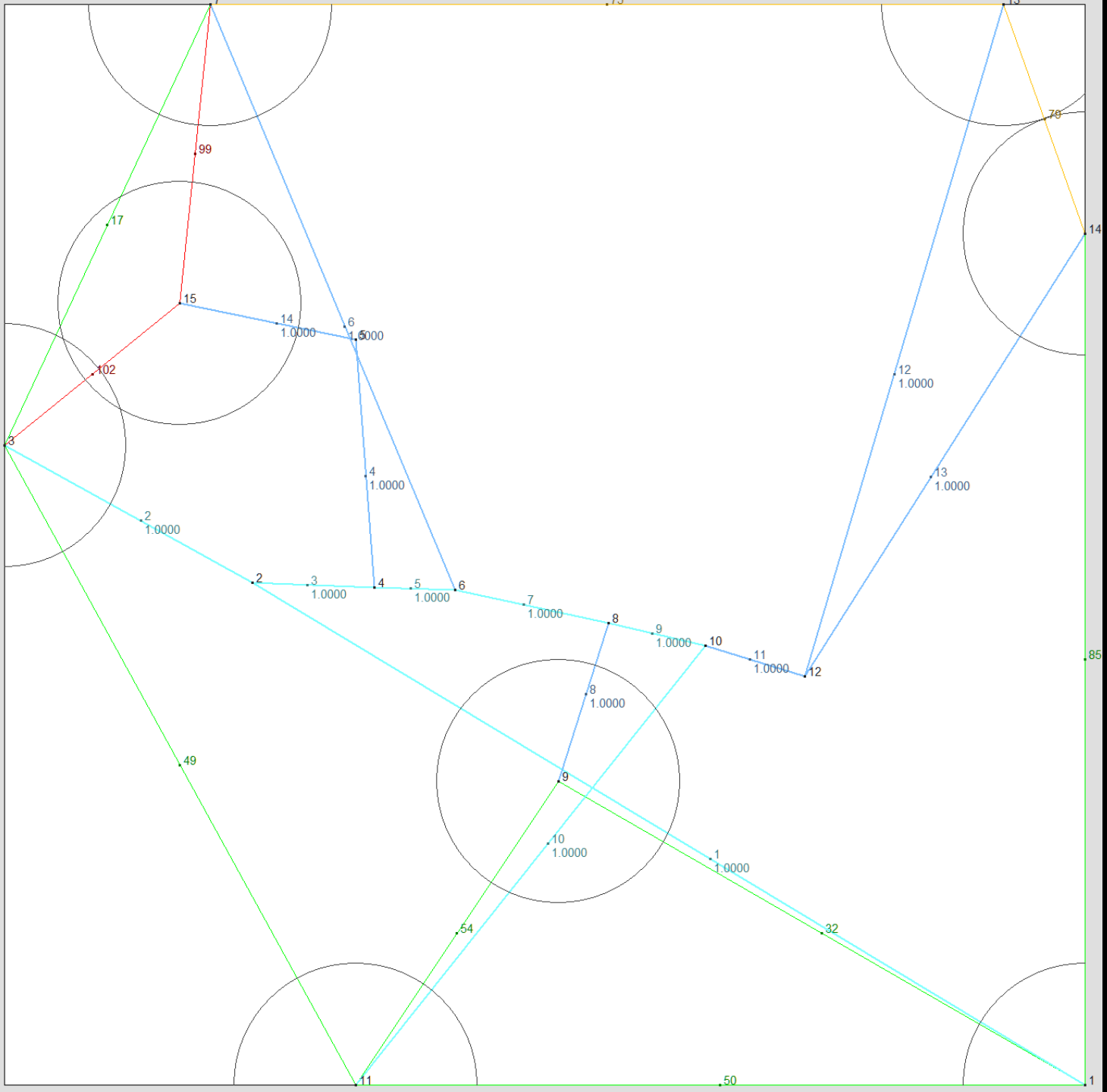


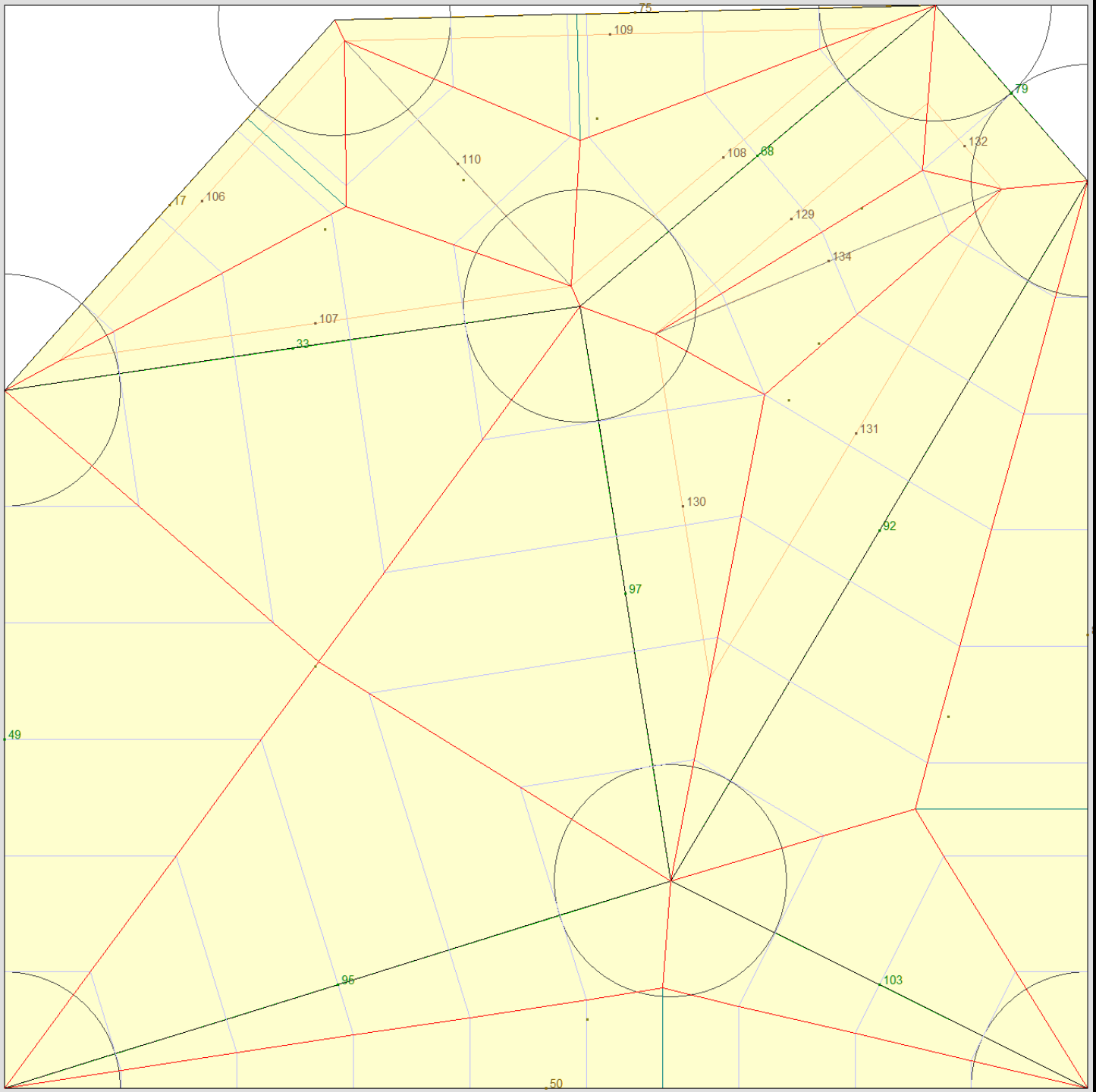


I'd like to see more of the triangulation algorithm


3
2
1.0000
5
4
1.0000
7
6
1.0000
9
8
1.0000
11
10
1.0000
13
12
1.0000
1
1.0000
2
3
1.0000
4
5
1.0000
6
7
1.0000
8
9
1.0000
10
11
1.0000
12
13
1.0000
1
14


Note
TreeMaker wasn't able to construct all polygons, possibly because a polygon was nonconvex or contained one or more nodes in its interior. This is common with many-branched trees. Try selecting all unpinned edges, performing an edge optimization, then rebuilding the polygons and/or crease pattern.
OK
75
13
70
70
17
14
6
1.5000
3
4
1.0000
2
1.0000
2
3
1.0000
4
5
1.0000
6
30
7
1.0000
8
9
1.0000
10
11
1.0000
12
85
8
1.0000
49
9
10
1.0000
1
1.0000
54
32
11
50
1

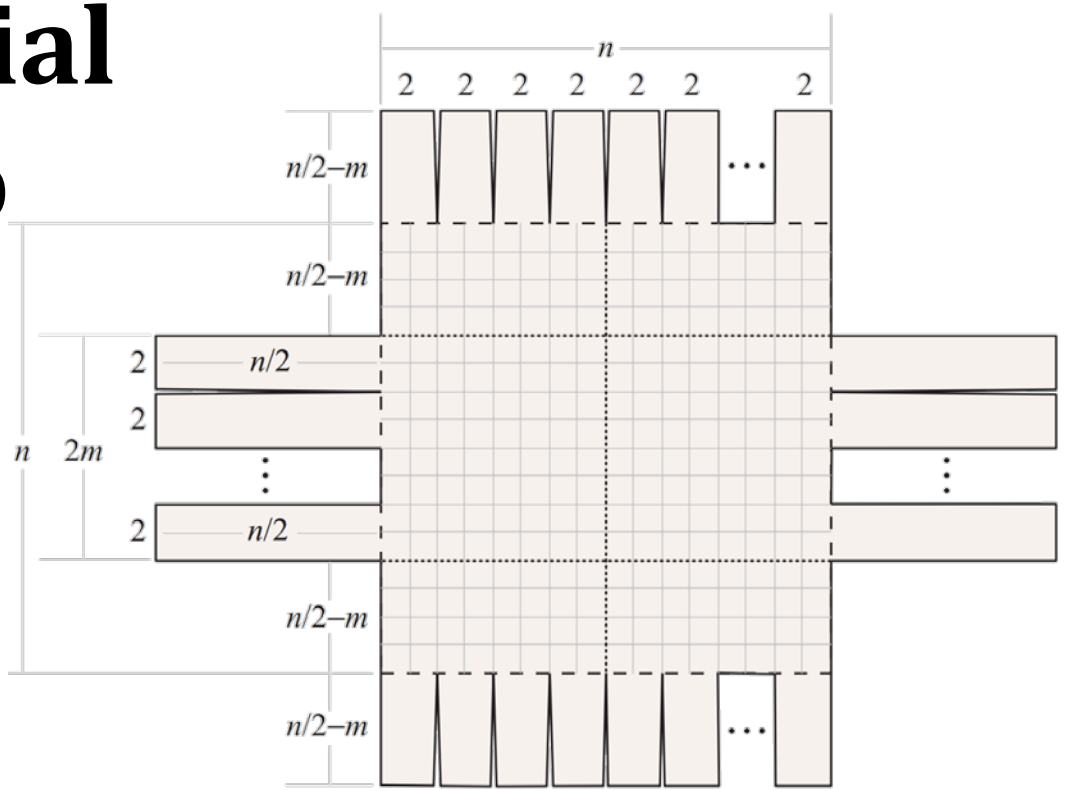

99
17
15
14
1.0000
6
5
1.0000
102
3
4
1.0000
2
1.0000
2
3
1.0000
4
5
1.0000
6
7
1.0000
8
9
1.0000
10
11
1.0000
12
1.0000
13
1.0000
14
12
1.0000
8
1.0000
49
9
10
1.0000
1
1.0000
54
32
11
50
1
85


75
109
79
110
108
68
132
17
106
129
134
107
32
131
130
92
97
49
95
103
50

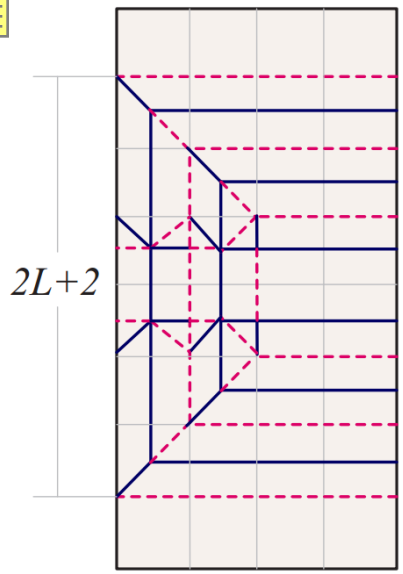
I would like to understand better how the Lang Universal Molecule works.

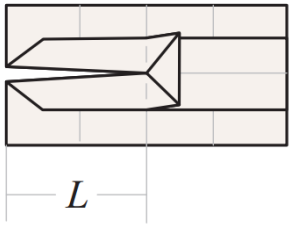
You mention a class of largely open problems where one tries to fold some 3D structure (such as a tetrahedron) optimally with a square of paper. Is there a name for this problem or some way to know what versions are open?

For the checkerboard, you said we can efficiently get arbitrary flaps, but this doesn't look at all like a uniaxial base — how do we get from there to here?

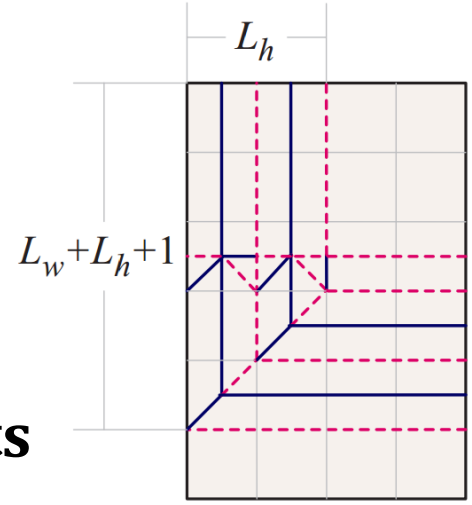


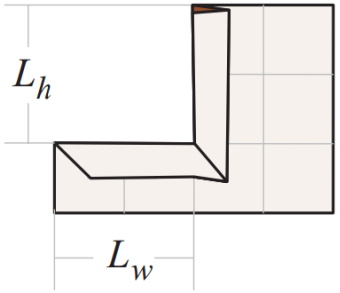
Demaine, Demaine, Konjevod, Lang 2009



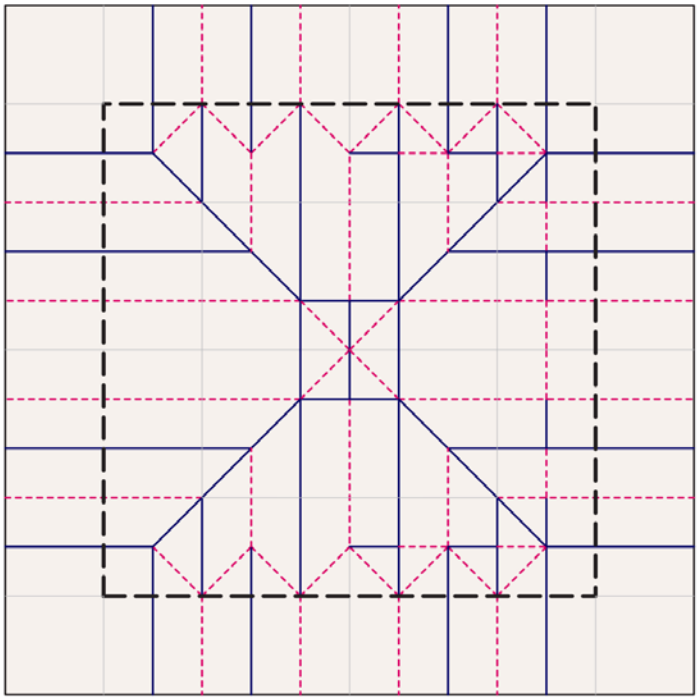


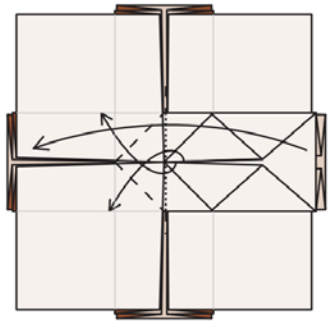
slots

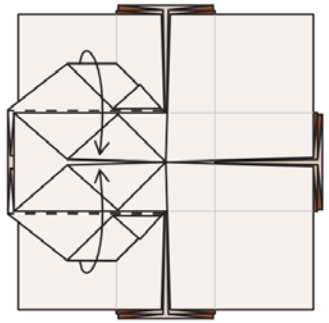


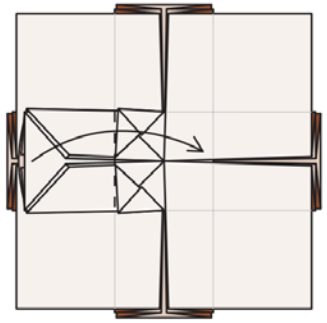


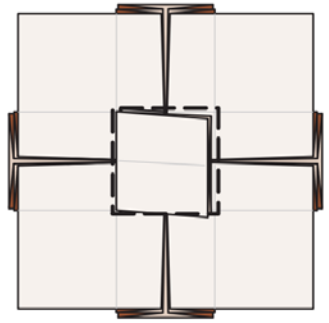
tab





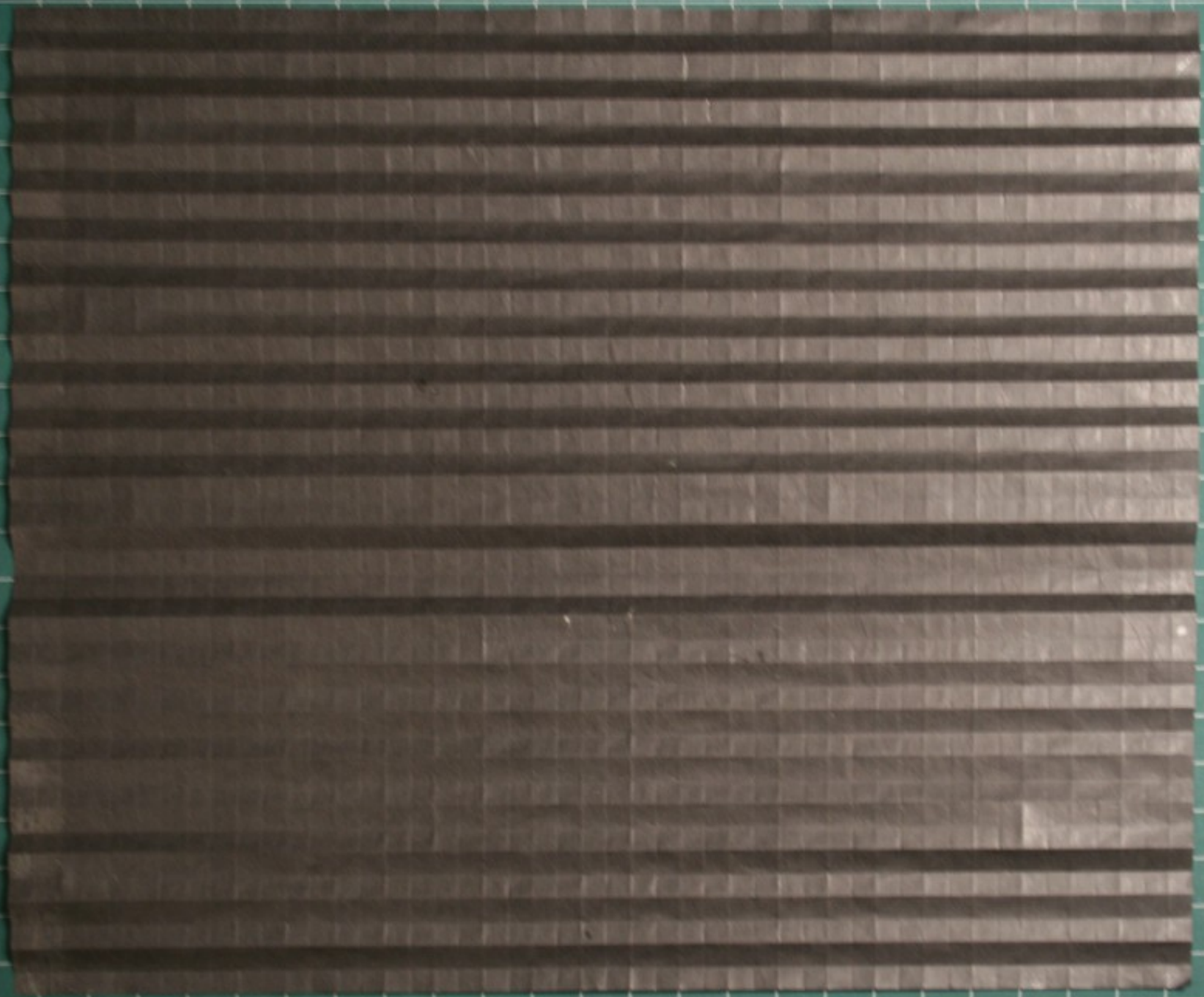




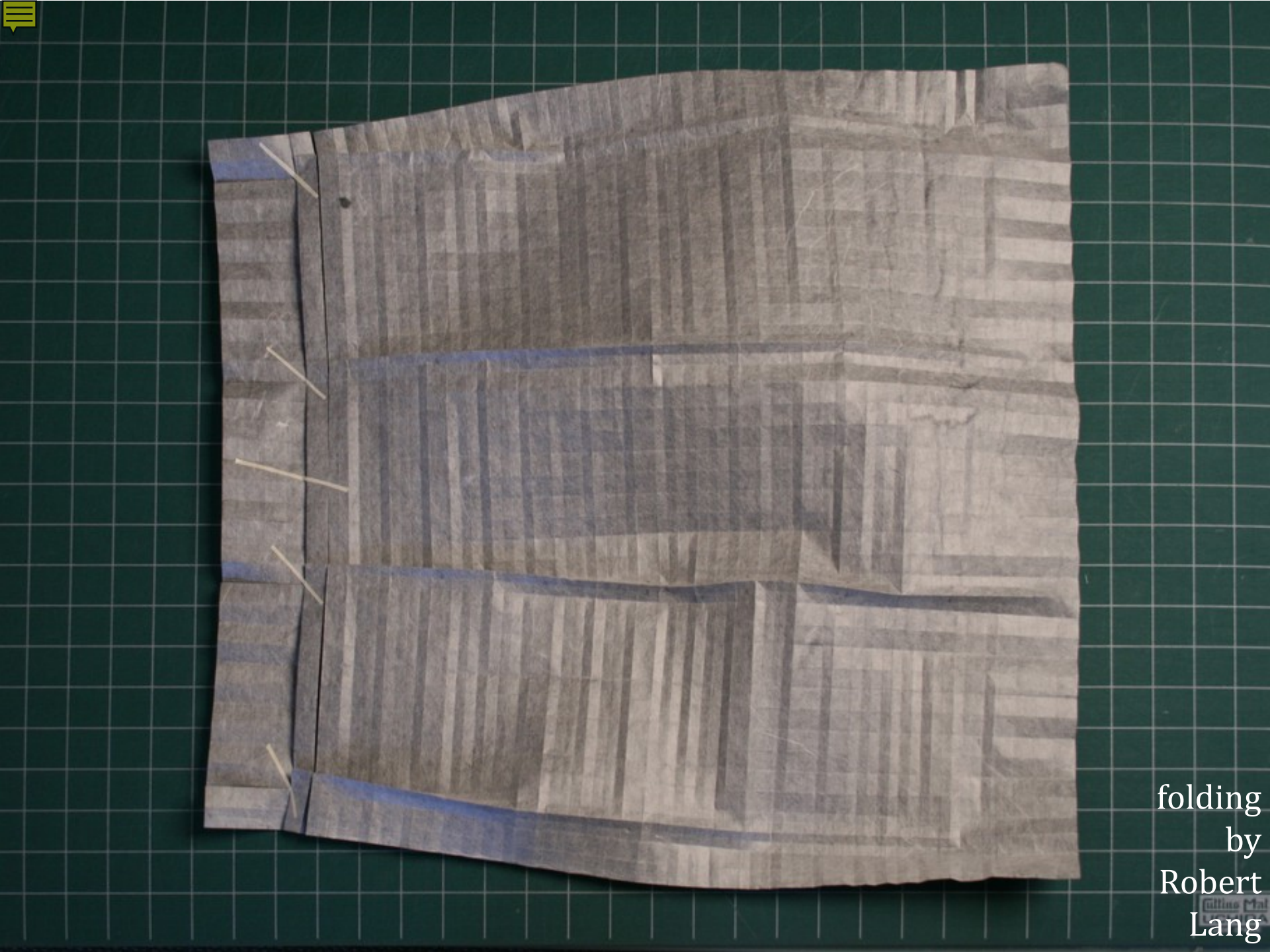


Demaine, Demaine, Konjevod, Lang 2009

Has anybody written software to take an image, sample at low resolution, and create the checkerboard-type folding pattern?

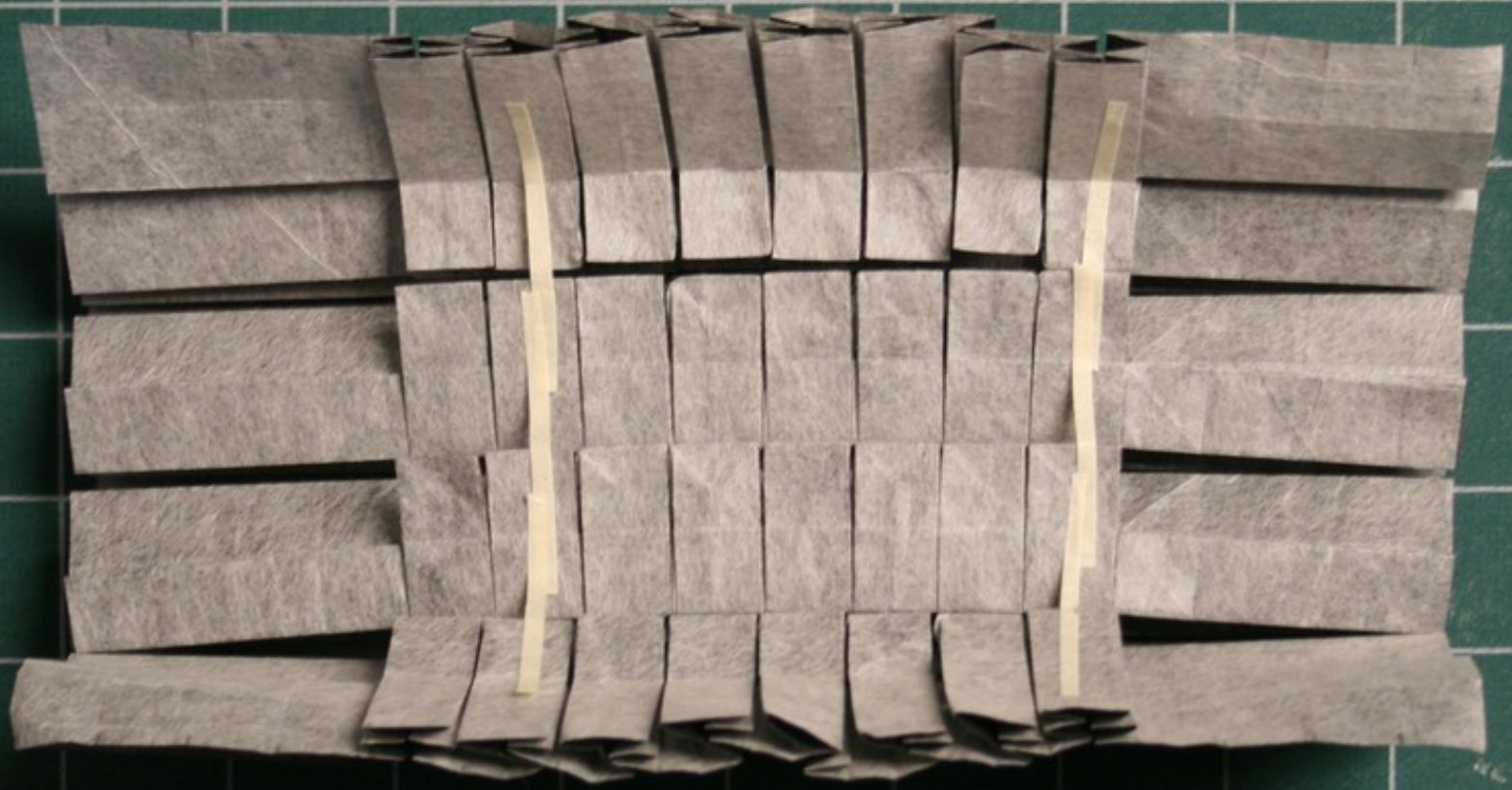


folding
by
Robert
Lang


folding
by
Robert
Lang

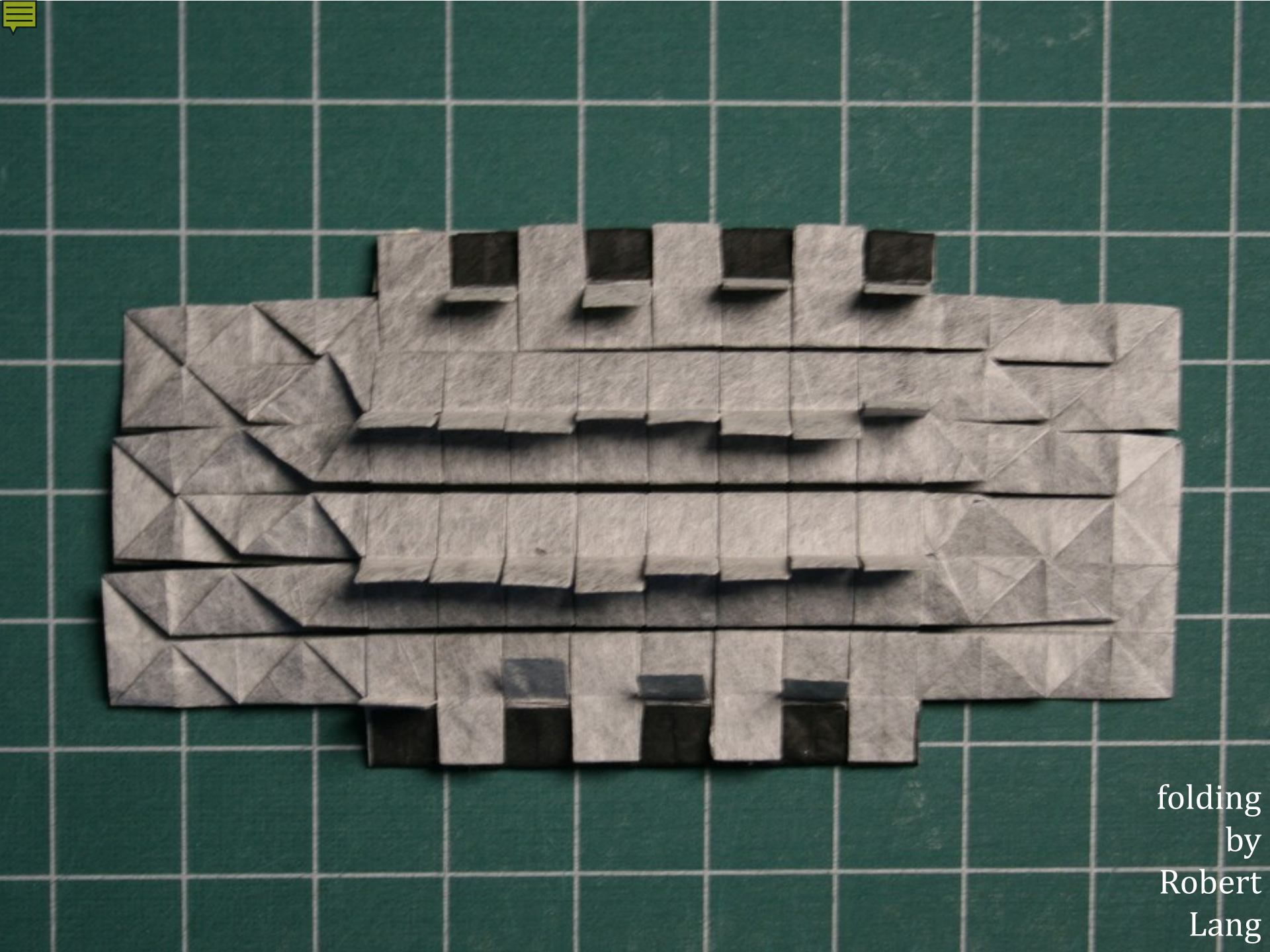

folding
by
Robert
Lang

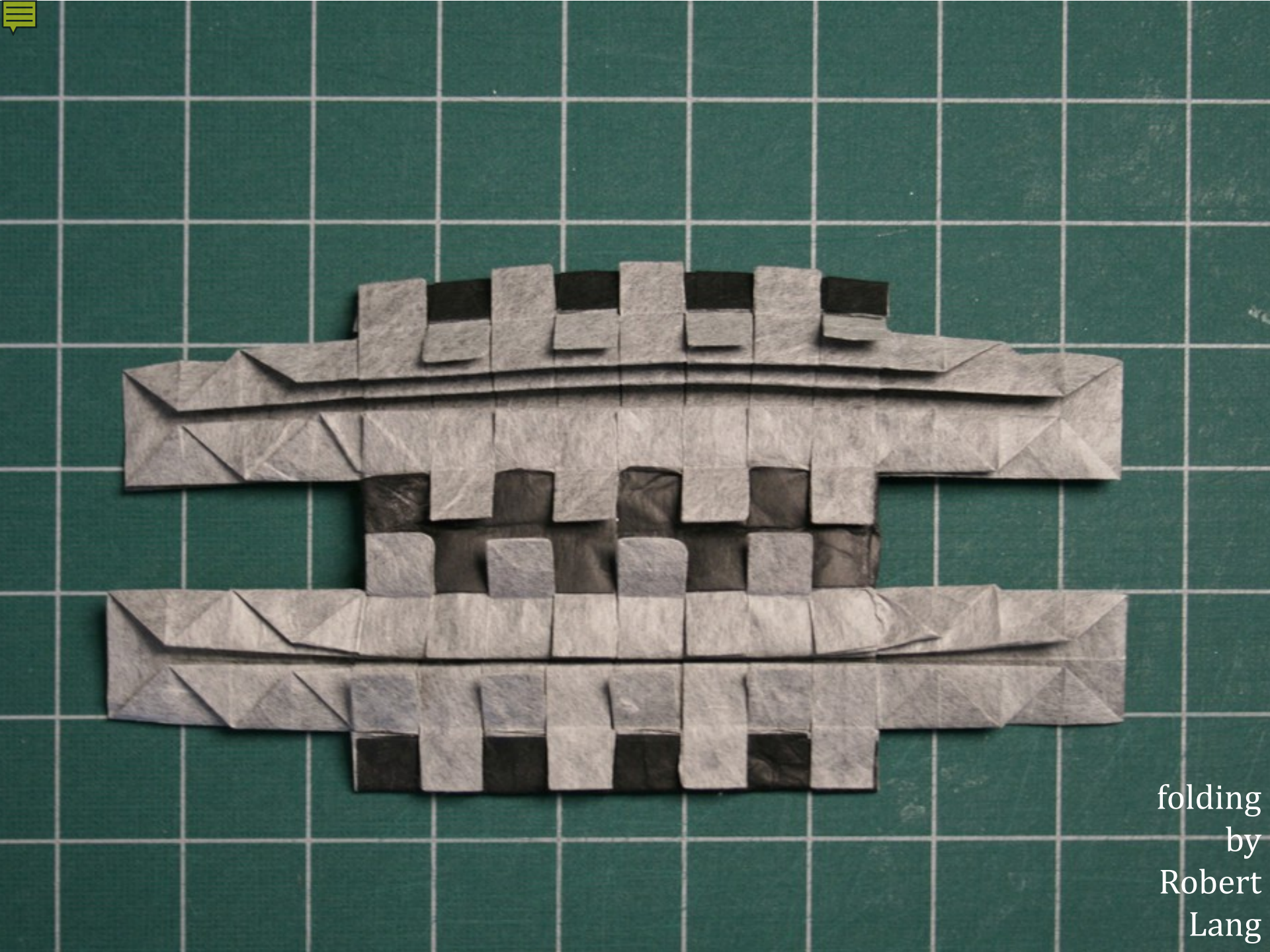

folding
by
Robert
Lang



folding
by
Robert
Lang

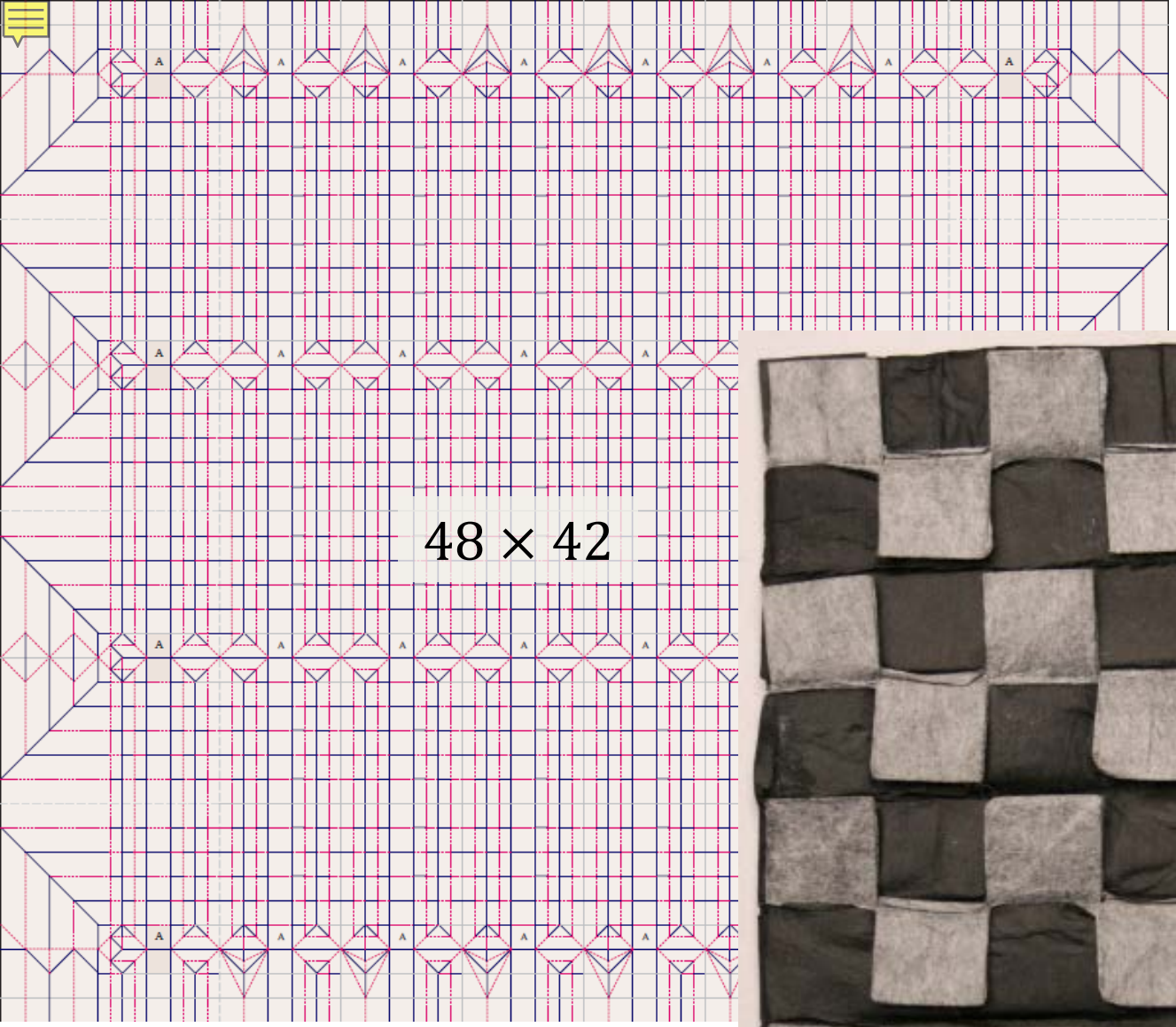

folding
by
Robert
Lang


folding
by
Robert
Lang


folding
by
Robert
Lang


folding
by
Robert
Lang

[Demaine, Demaine, Konjevod, Lang 2009]



"Wow, that was not one of the easier things I've done."
— Robert Lang

How does the version of Origamizer that's actually in software but not proven work?

298 IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS, VOL. 16, NO. 2, MARCH/APRIL 2010

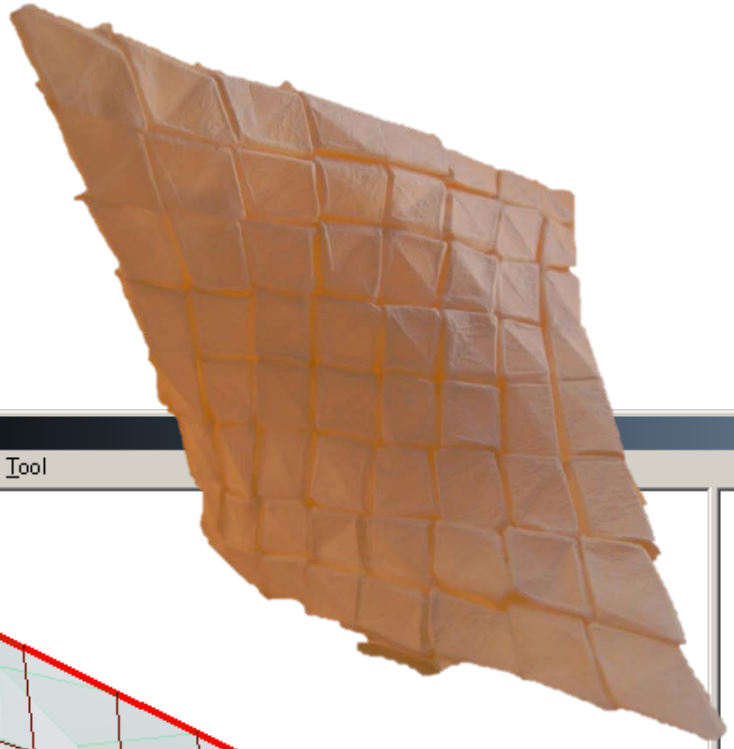
Origamizing Polyhedral Surfaces

Tomohiro Tachi, *Student Member, IEEE*

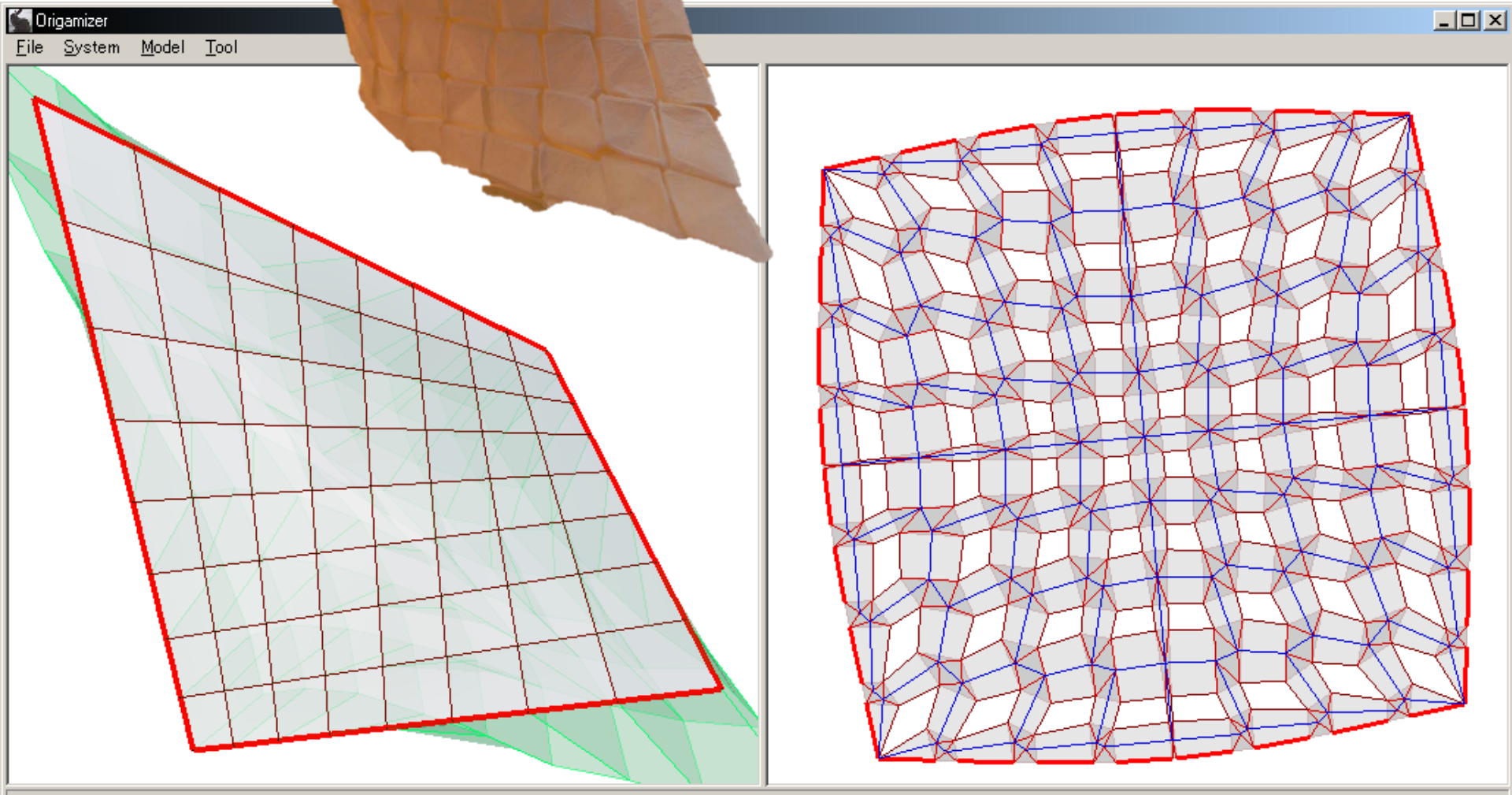
Abstract—This paper presents the first practical method for "origamizing" or obtaining the folding pattern that folds a single sheet of material into a given polyhedral surface without any cut. The basic idea is to tuck fold a planar paper to form a three-dimensional shape. The main contribution is to solve the inverse problem; the input is an arbitrary polyhedral surface and the output is the folding pattern. Our approach is to convert this problem into a problem of laying out the polygons of the surface on a planar paper by introducing the concept of tucking molecules. We investigate the equality and inequality conditions required for constructing a valid crease pattern. We propose an algorithm based on two-step mapping and edge splitting to solve these conditions. The two-step mapping precalculates linear equalities and separates them from other conditions. This allows an interactive manipulation of the crease pattern in the system implementation. We present the first system for designing three-dimensional origami, enabling a user can interactively design complex spatial origami models that have not been realizable thus far.

Index Terms—Origami, origami design, developable surface, folding, computer-aided design.

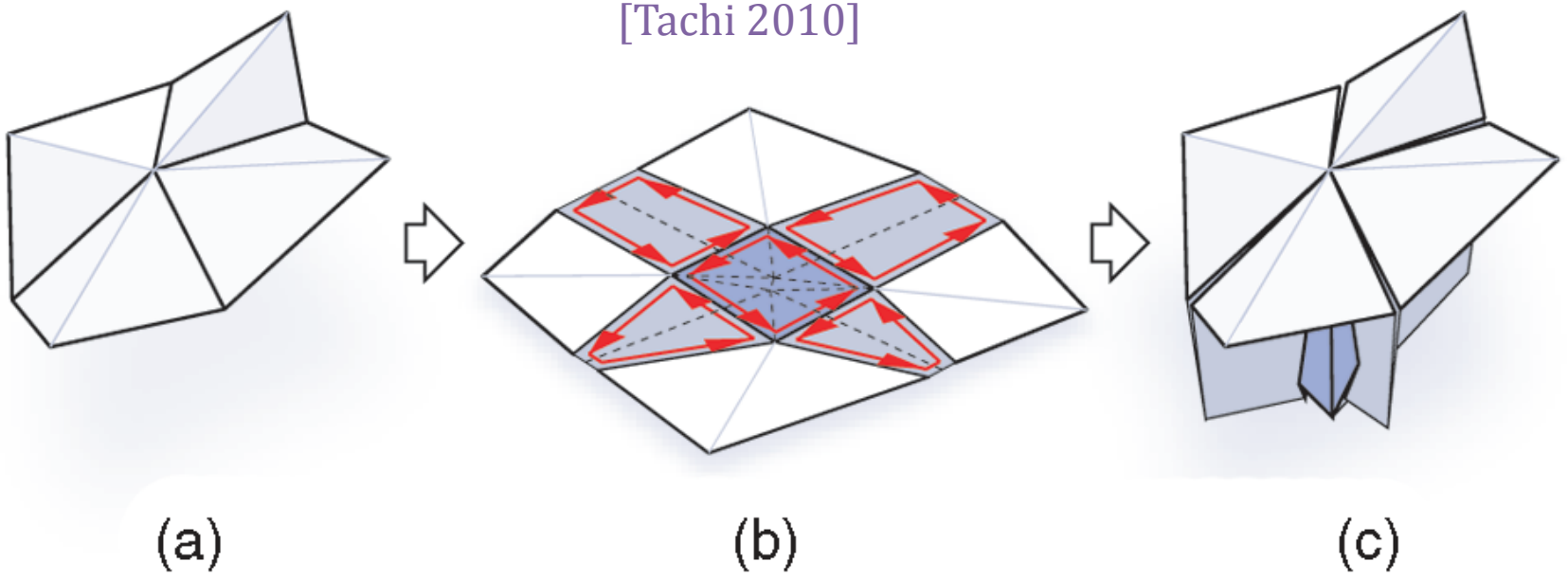
http://www.flickr.com/photos/tactom/



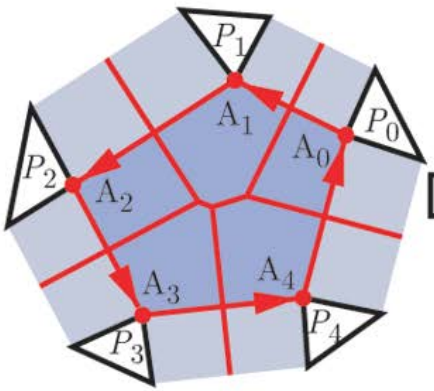
"Origamizer Screenshots for Hypar"
Tomohiro Tachi, 2007

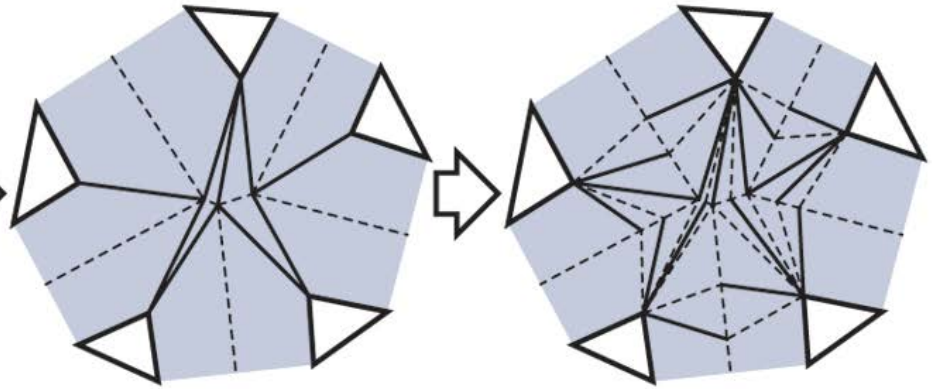


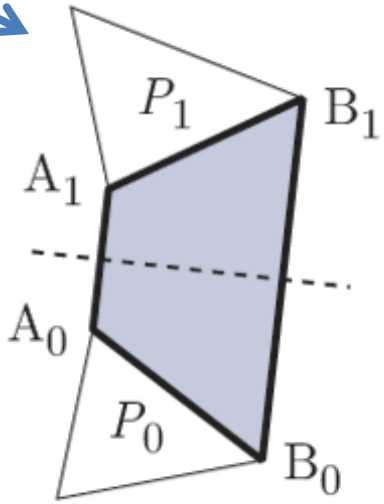
[Tachi 2010]



Vertex-Tucking Molecule Edge-Tucking Molecule Surface Polygon







Voronoi diagram

Could you explain the tuck gadgets for the Origamizer a little more fully?

How do the tuck proxies work?

I was definitely very confused in the last few minutes with those diagrams with circles and spheres...