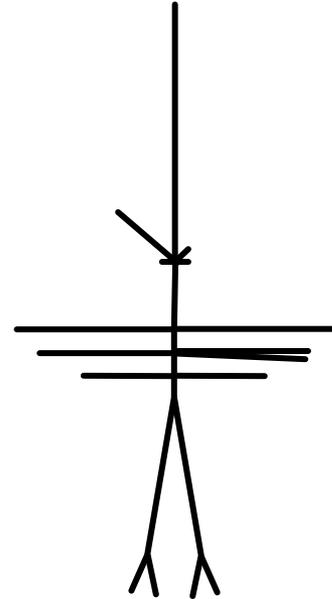


It's not clear to me that all of the examples (nazgul, scorpion, shrimp, etc.) are uniaxial. At least they don't seem to be. But I thought the algorithm you were describing worked only for uniaxial origamis?

Figure removed due to copyright restrictions.

Refer to: Fig. 11.35–37 from Lang, Robert J. *Origami Design Secrets: Mathematical Methods for an Ancient Art*. 2nd ed. A K Peters / CRC Press, 2011, pp. 406–8.



Tree diagrams drawn by Erik Demaine.

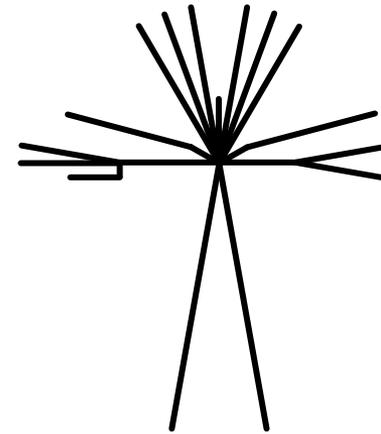
“Scorpion varileg, opus 379”
Robert Lang, 2002



Courtesy of Robert J. Lang. Used with permission.

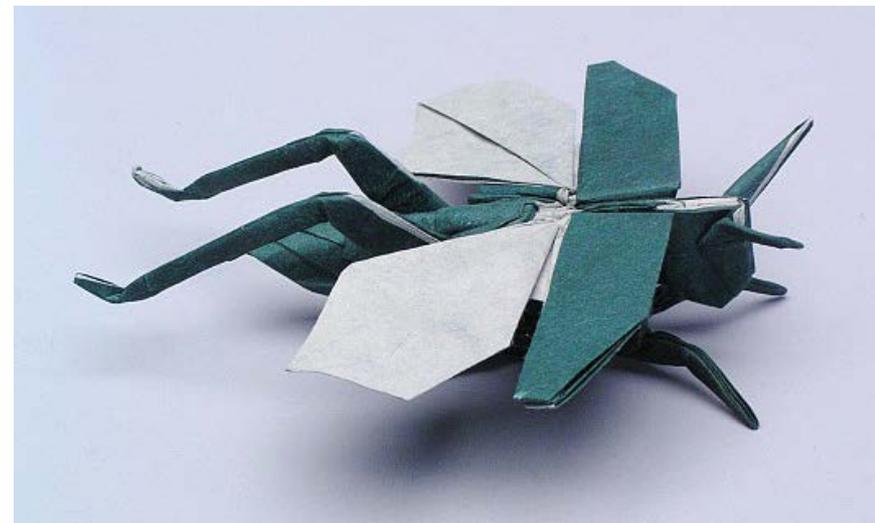
Figure removed due to copyright restrictions.

Refer to: Fig. 11.35–37 from Lang, Robert J. *Origami Design Secrets: Mathematical Methods for an Ancient Art*. 2nd ed. A K Peters / CRC Press, 2011, pp. 406–8.



Tree diagrams drawn by Erik Demaine.

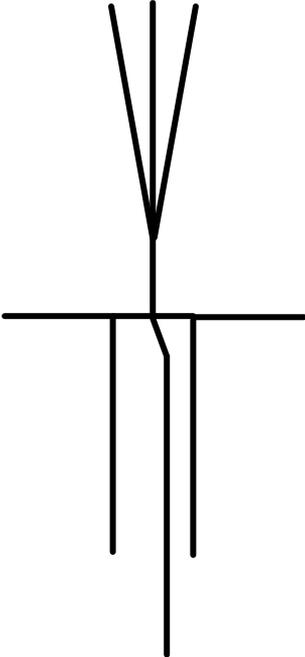
“Flying Grasshopper, opus 382”
Robert Lang, 2003



Courtesy of Robert J. Lang. Used with permission.

Figure removed due to copyright restrictions.

Refer to: Fig. 11.35–37 from Lang, Robert J. *Origami Design Secrets: Mathematical Methods for an Ancient Art*. 2nd ed. A K Peters / CRC Press, 2011, pp. 406–8.

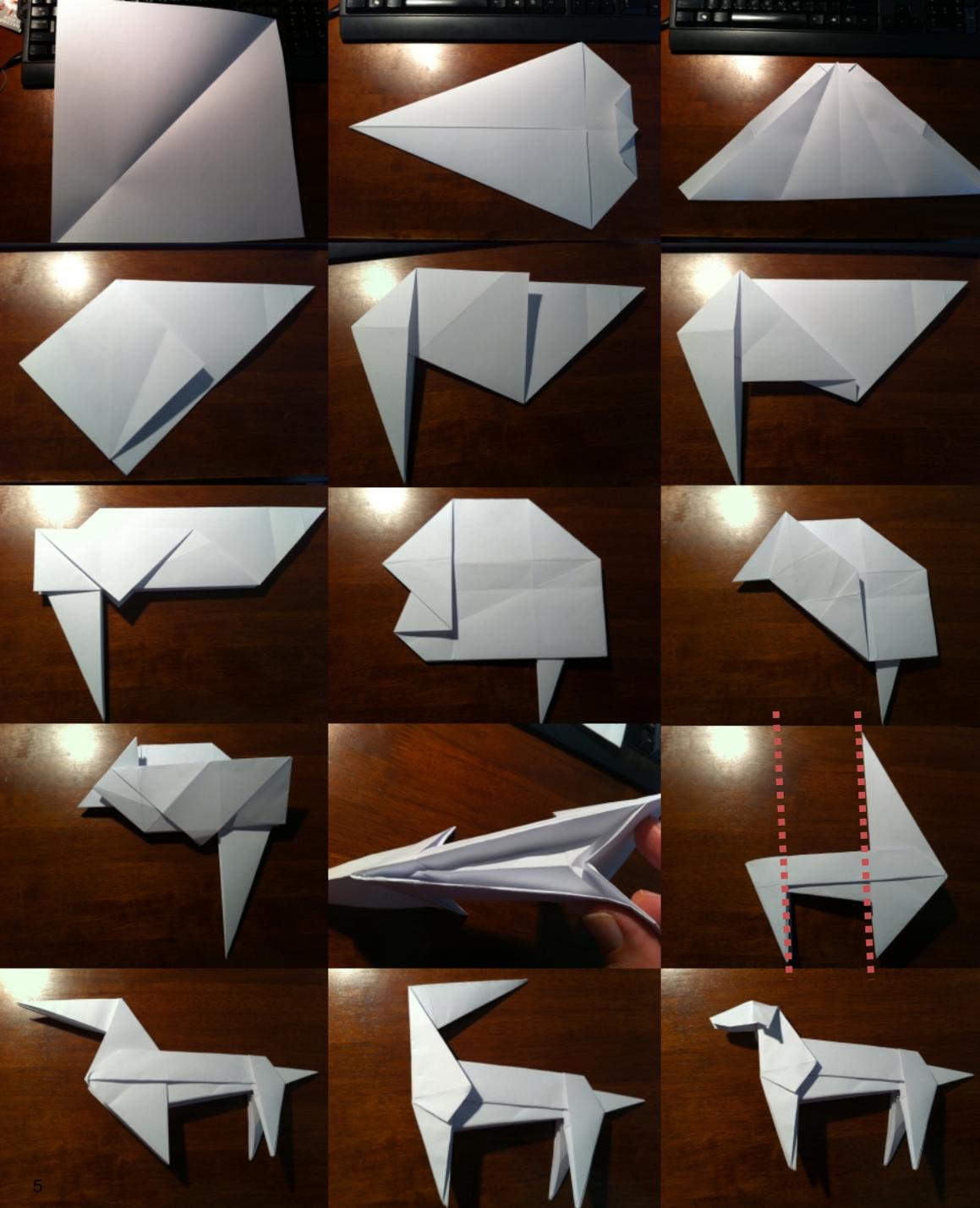


Tree diagrams drawn by Erik Demaine.

“Alamo Stallion, opus 384” Robert Lang, 2002

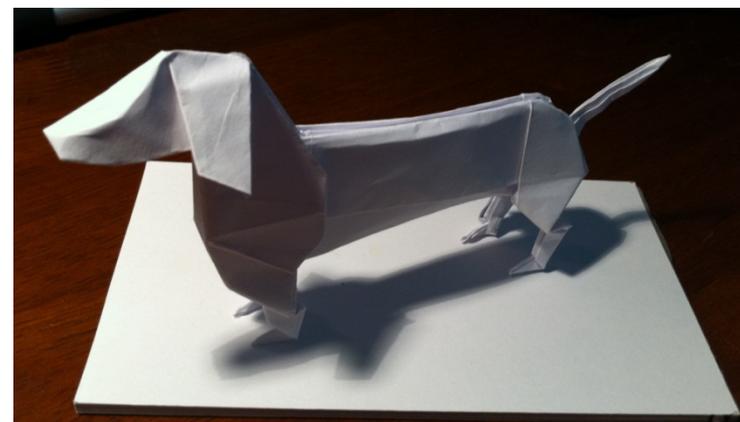


Courtesy of Robert J. Lang. Used with permission.

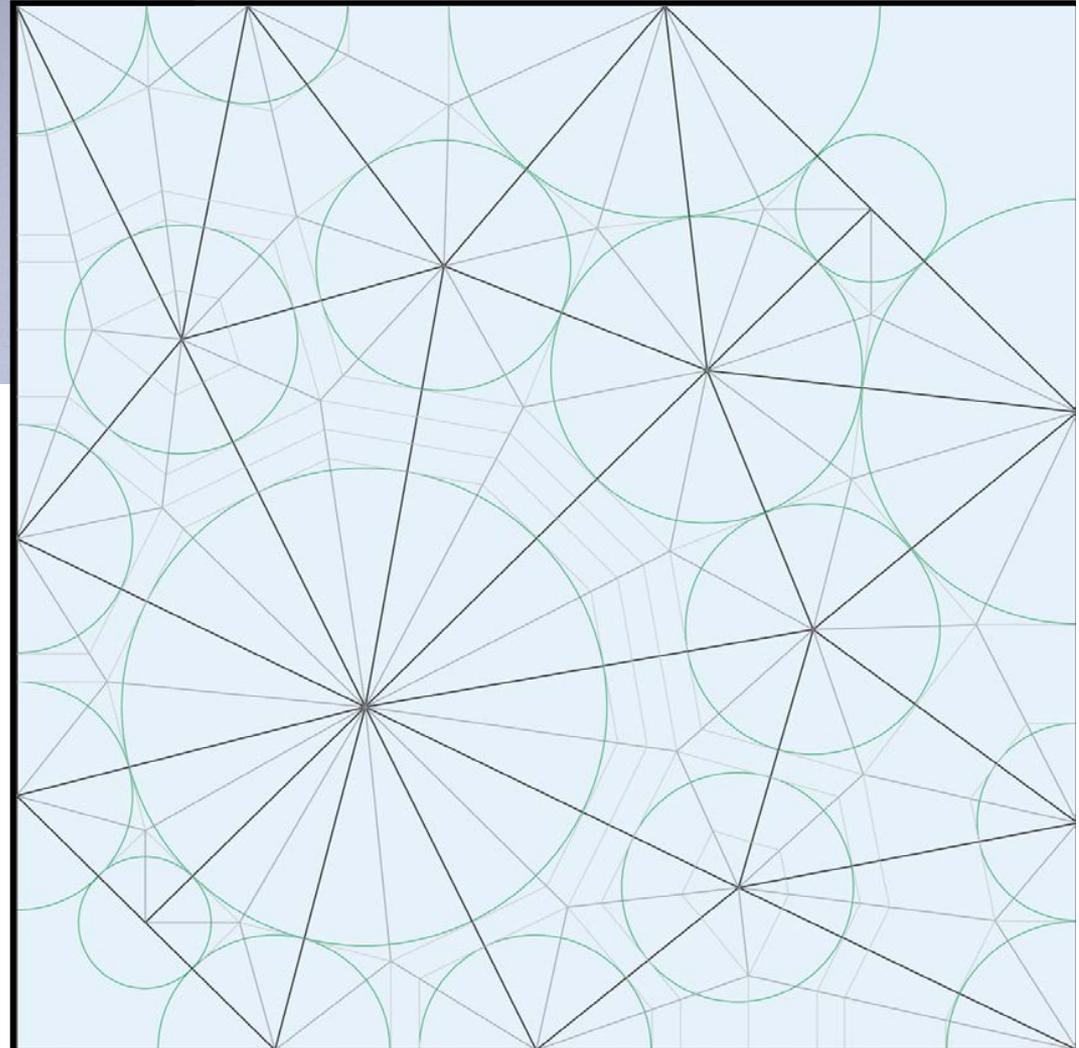


John Montroll's
"Dog Base"
&
"Sausage Dog"

folded by
Wonko, 2011



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

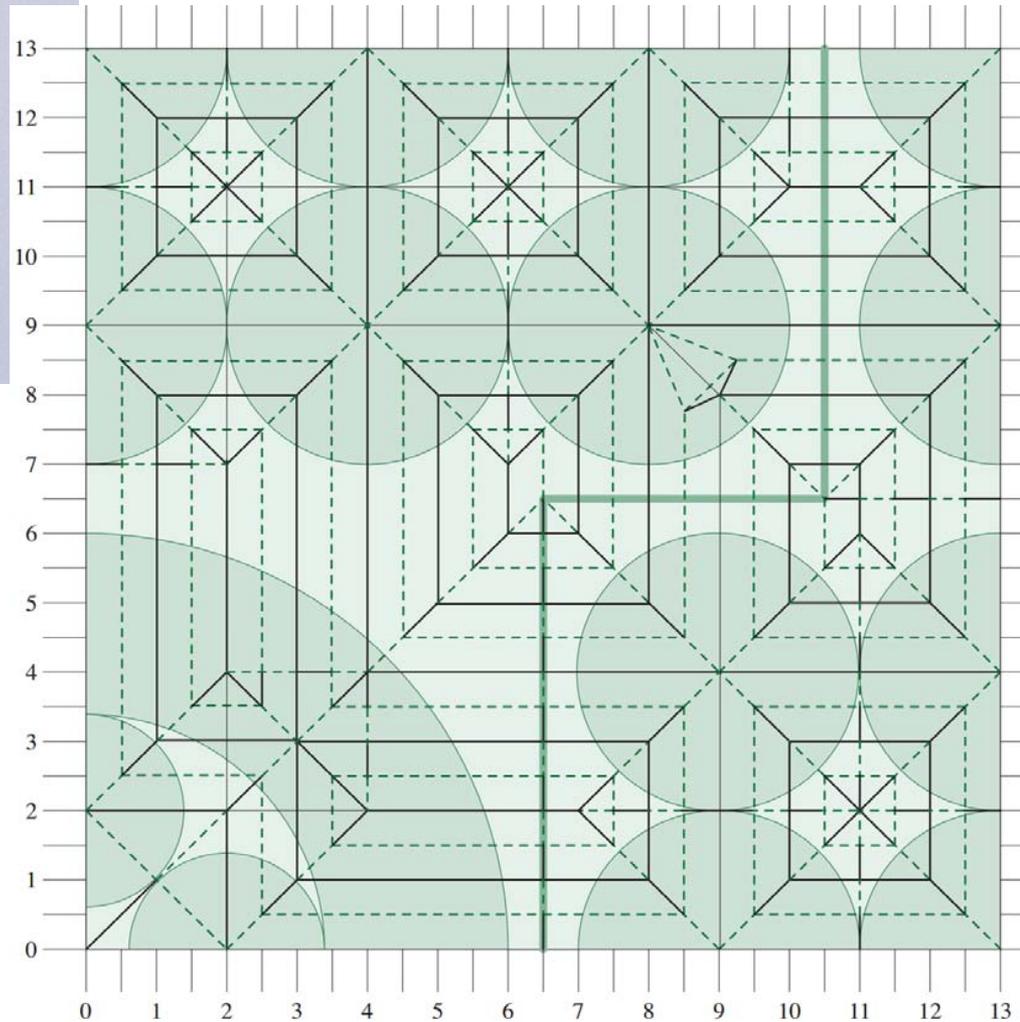


“Maine Lobster, opus 447”
Robert Lang, 2004

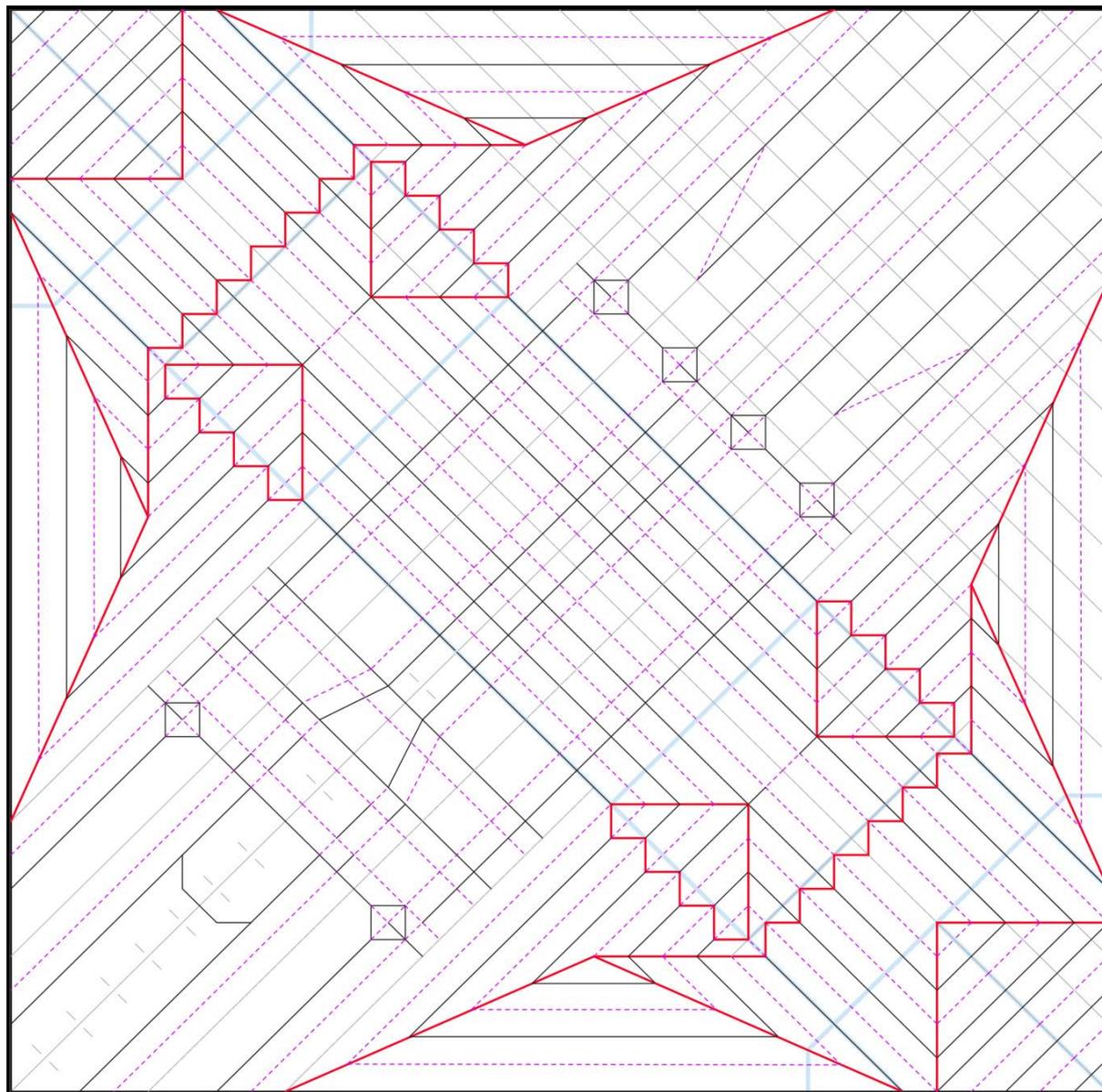
Courtesy of Robert J. Lang. Used with permission.



“Fiddler Crab, opus 446”
Robert Lang, 2004

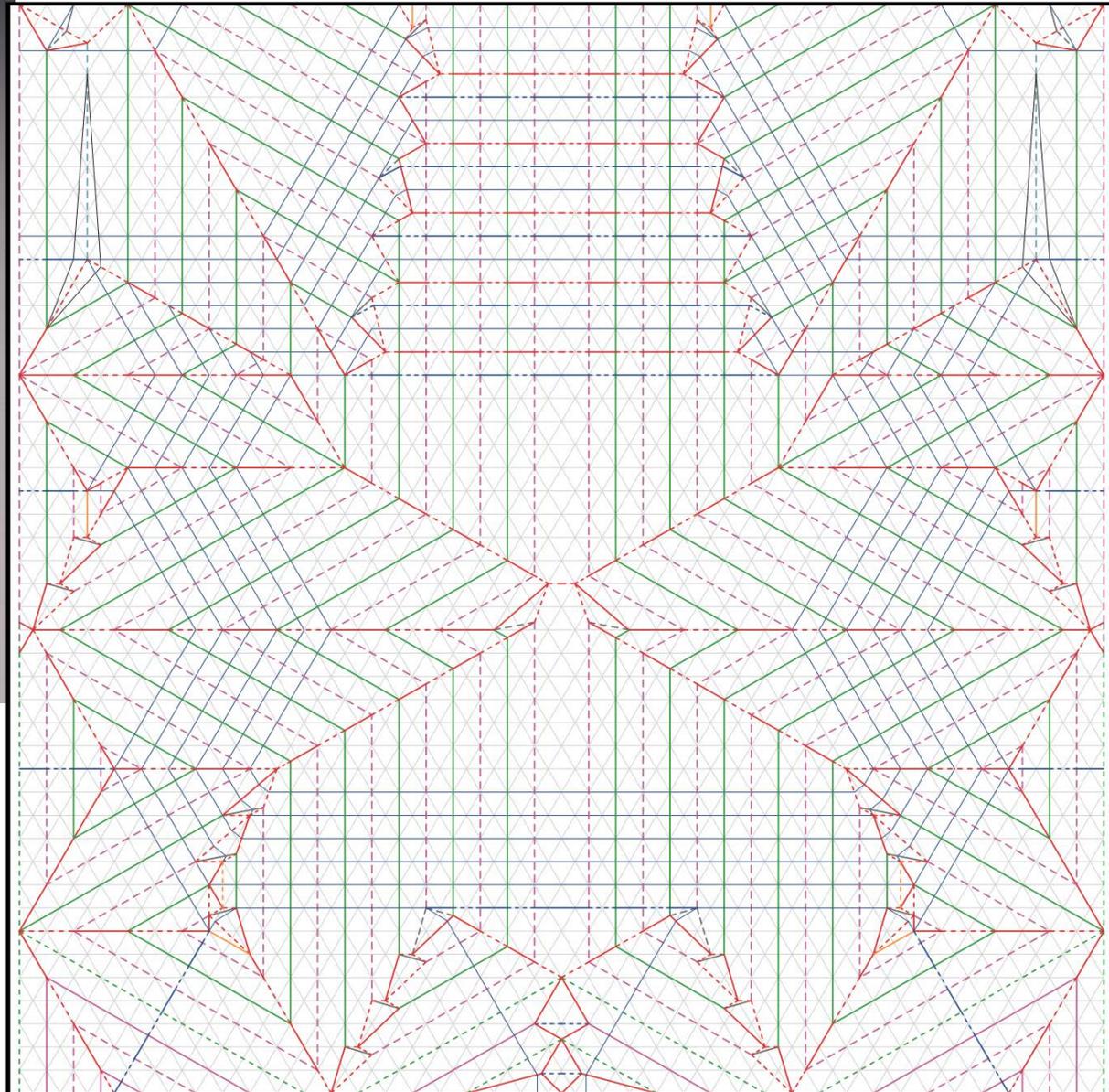


Courtesy of Robert J. Lang. Used with permission.

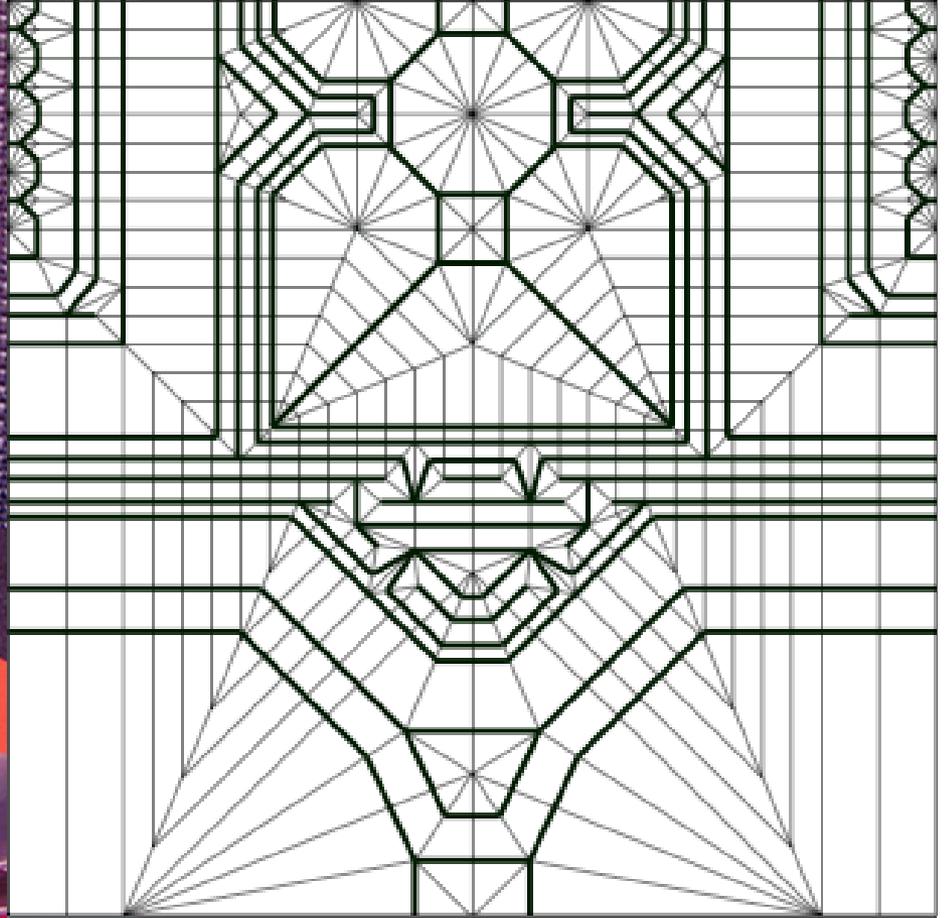
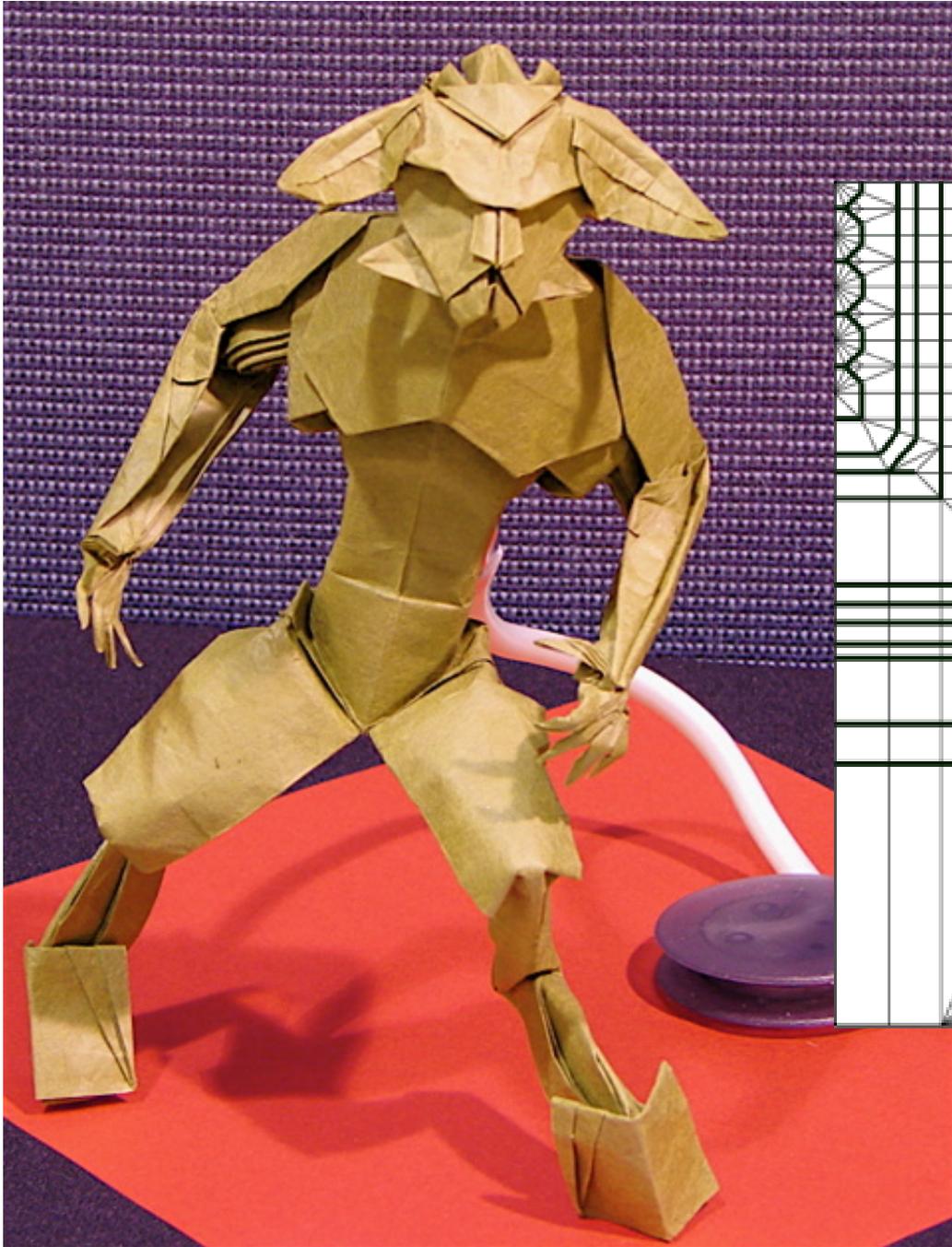


**“C. P. Snow, opus 612”
Robert Lang, 2009**

Courtesy of Robert J. Lang. Used with permission.

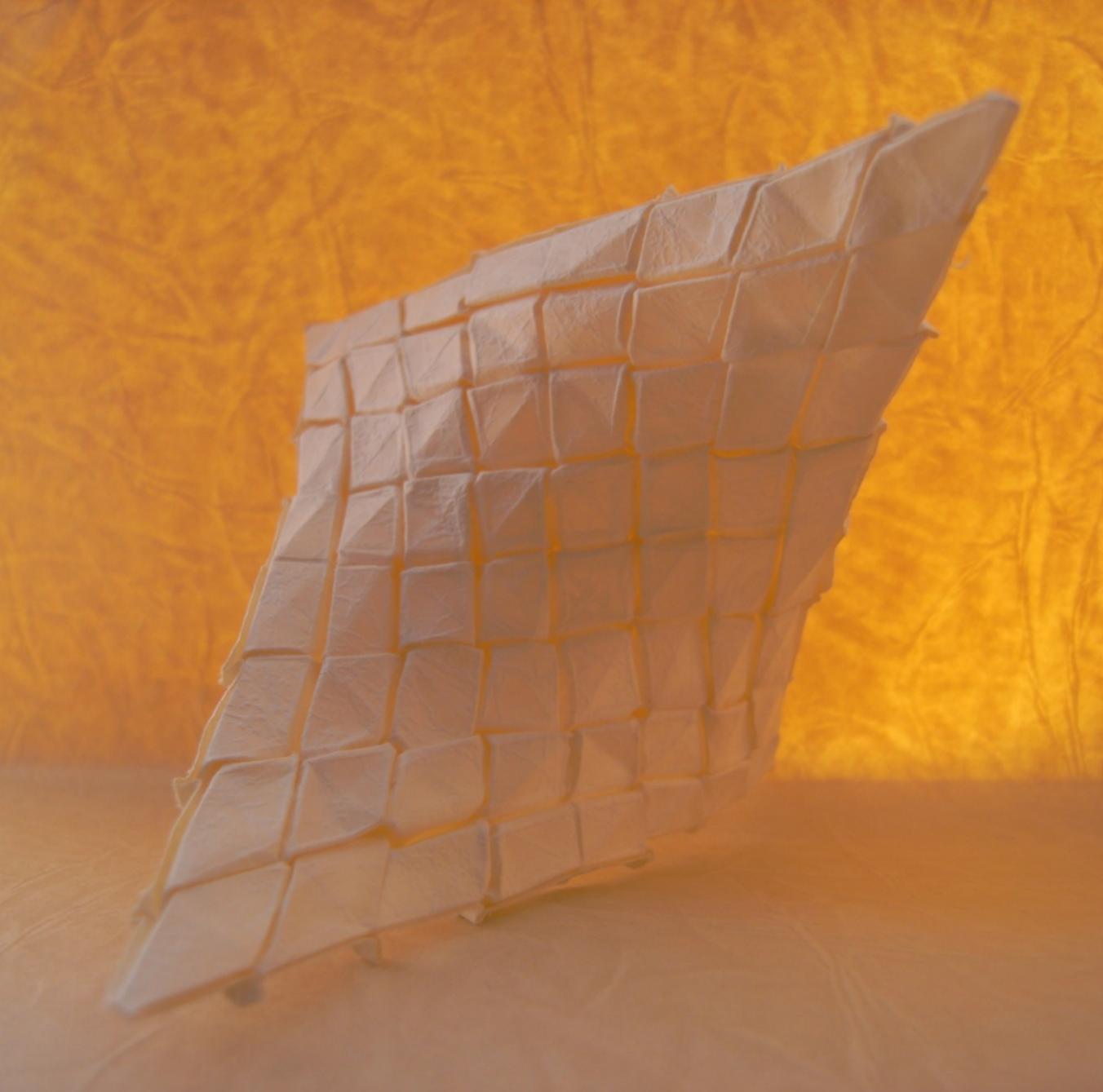


“Emperor Scorpion,
opus 593”
Robert Lang, 2011

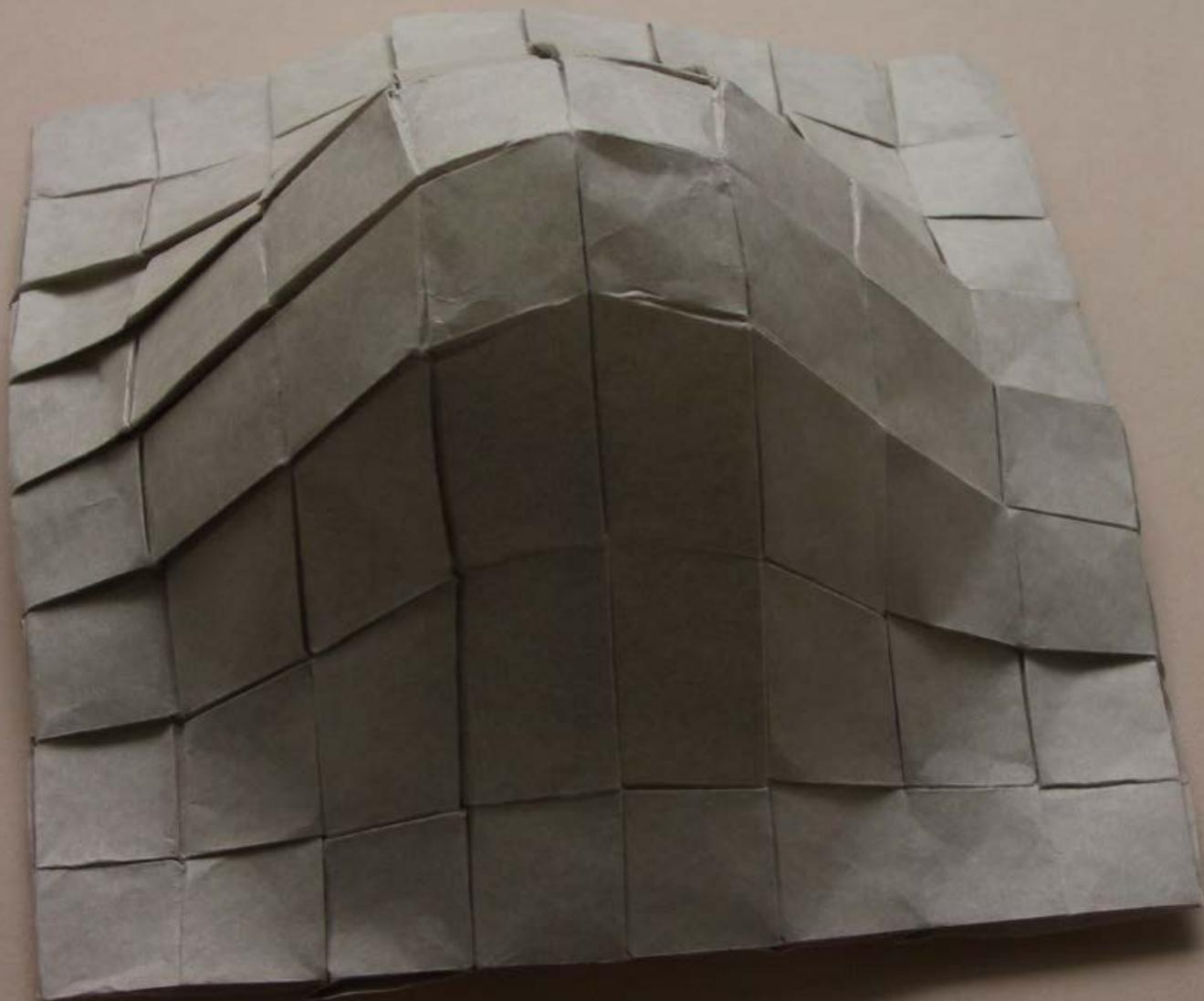


“Pan 1.6”
Jason Ku, 2007

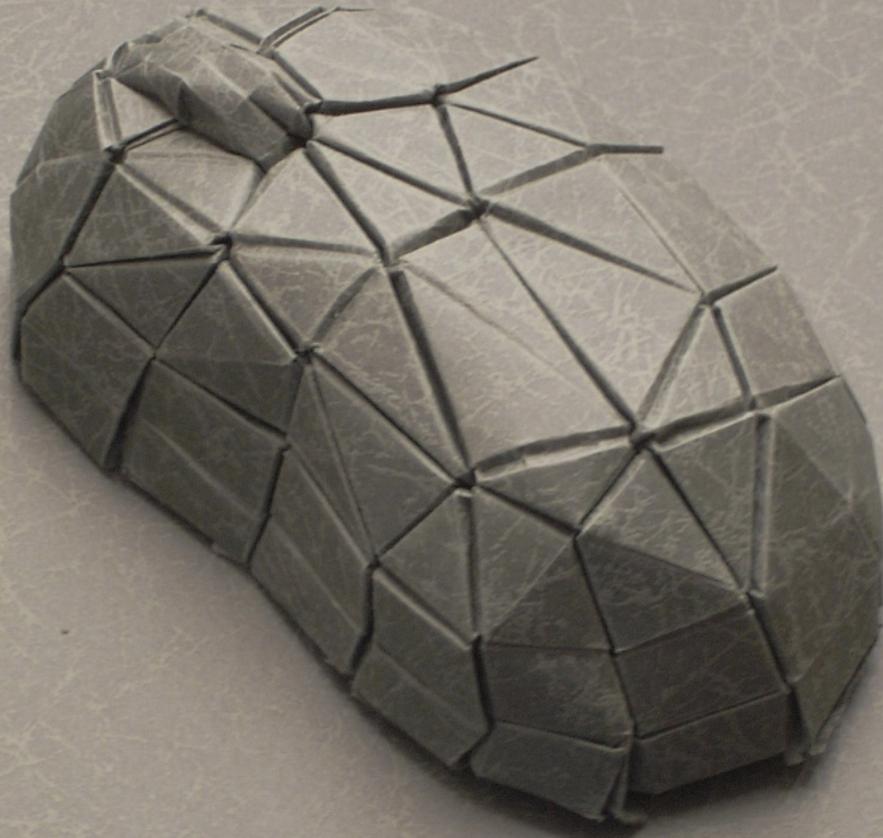
Courtesy of Jason Ku. Used with permission.



“tessellated
hypar”
Tomohiro Tachi
2007



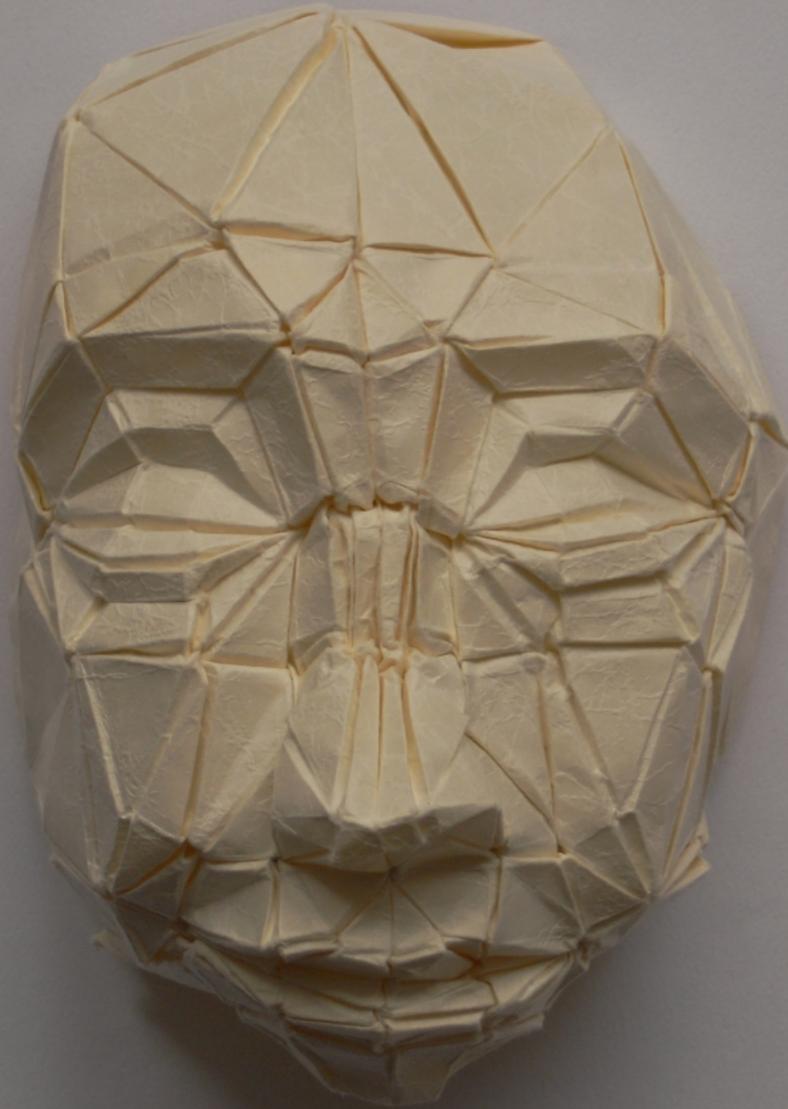
“3D origami
bell shape”
Tomohiro Tachi
2007



“Mouse”
Tomohiro Tachi
2007

Courtesy of Tomohiro Tachi. Used with permission. Under CC-BY-NC.

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



“3D mask”
Tomohiro Tachi
2007



Photo courtesy of [ash-man](#) on Flickr. Used with permission. License CC BY-NC-SA.

“Tetrapod”
Tomohiro Tachi
2008

Courtesy of Tomohiro Tachi. Used with permission. Under CC-BY-NC.

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



“Leaf of Kajinoki
(*Broussonetia
Papyrifera*)”
Tomohiro Tachi
2007



To view video of folding the Stanford bunny, by Tomohiro Tachi: <http://www.youtube.com/watch?v=GAnW-KU2yn4>.



“Origami
Stanford
Bunny”
Tomohiro Tachi
2007

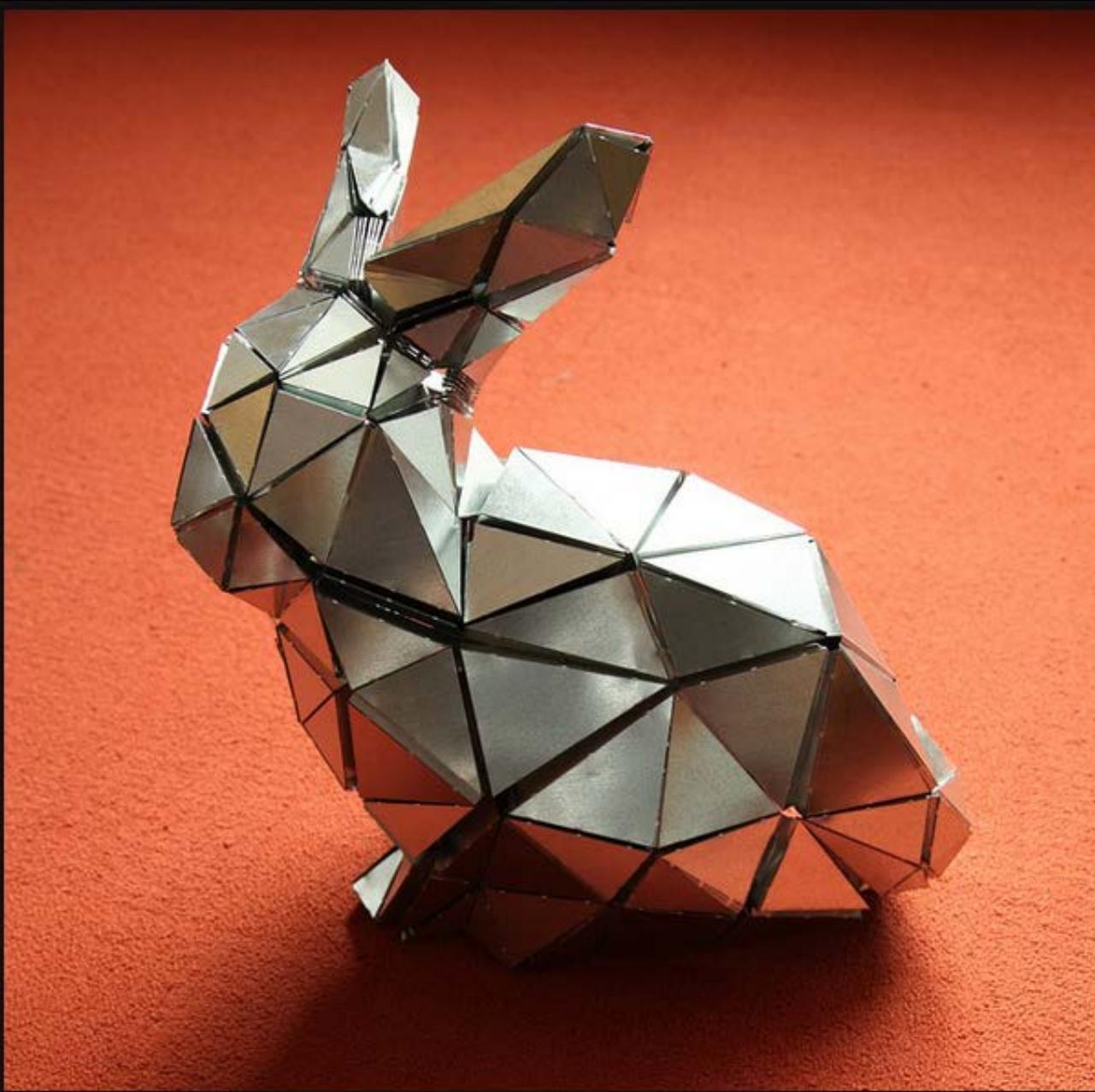
Courtesy of Tomohiro Tachi. Used with permission. Under CC-BY-NC.

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



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[Cheung, Demaine, Demaine, Tachi 2011]



Courtesy of Tomohiro Tachi. Used with permission. Under CC-BY-NC.

[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?**

Cover and index image removed due to copyright restrictions.

Refer to: Lang, Robert J. *Origami Design Secrets: Mathematical Methods for an Ancient Art*. 2nd ed. A K Peters / CRC Press, 2011.

Figure removed due to copyright restrictions.

Refer to: Fig. 13.32–39 from Lang, Robert J. *Origami Design Secrets: Mathematical Methods for an Ancient Art*. 2nd ed. A K Peters / CRC Press, 2011, pp. 601–6.

Figure removed due to copyright restrictions.

Refer to: Fig. 13.32–39 from Lang, Robert J. *Origami Design Secrets: Mathematical Methods for an Ancient Art*. 2nd ed. A K Peters / CRC Press, 2011, pp. 601–6.

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Refer to: Fig. 13.32–39 from Lang, Robert J. *Origami Design Secrets: Mathematical Methods for an Ancient Art*. 2nd ed. A K Peters / CRC Press, 2011, pp. 601–6.

Figure removed due to copyright restrictions.

Refer to: Fig. 13.32–39 from Lang, Robert J. *Origami Design Secrets: Mathematical Methods for an Ancient Art*. 2nd ed. A K Peters / CRC Press, 2011, pp. 601–6.

Figure removed due to copyright restrictions.

Refer to: Fig. 13.32–39 from Lang, Robert J. *Origami Design Secrets: Mathematical Methods for an Ancient Art*. 2nd ed. A K Peters / CRC Press, 2011, pp. 601–6.

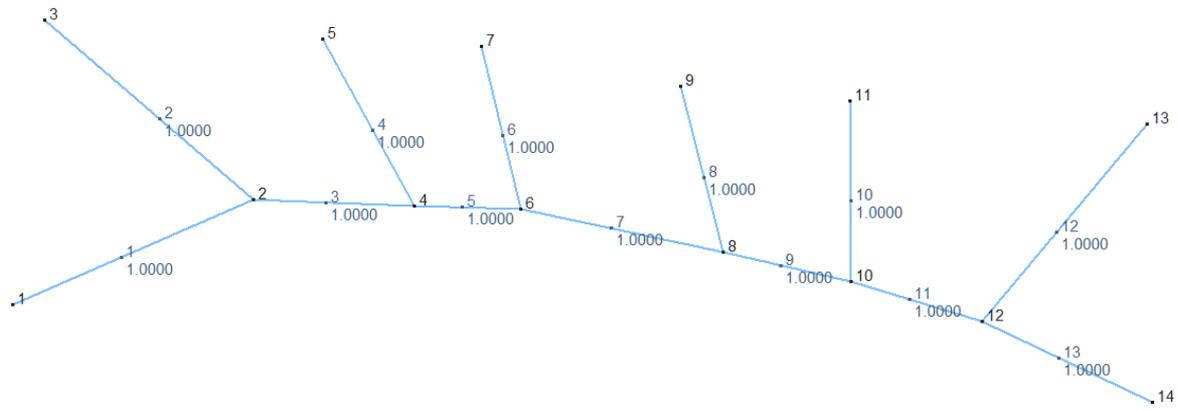
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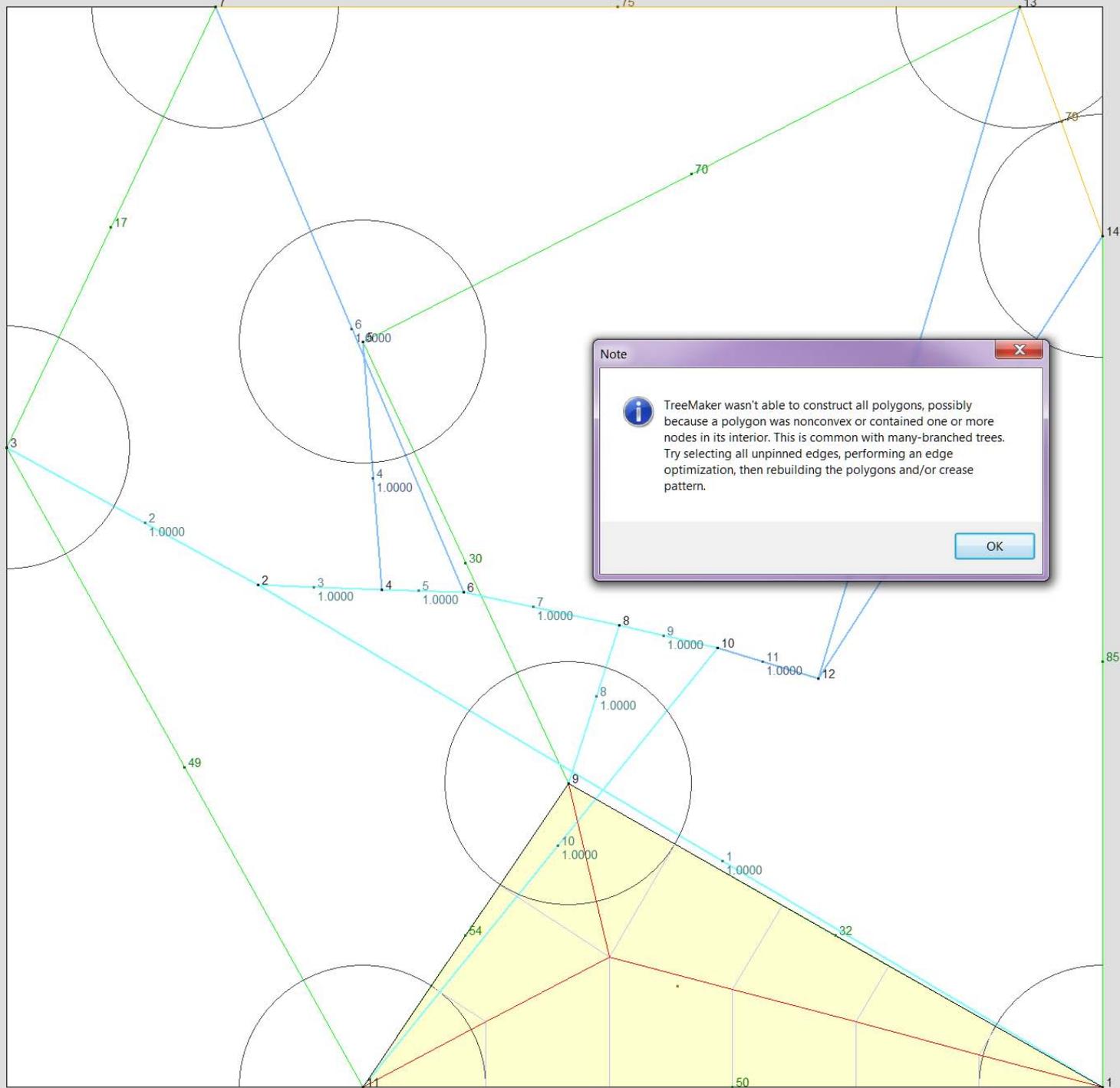
Refer to: Fig. 13.32–39 from Lang, Robert J. *Origami Design Secrets: Mathematical Methods for an Ancient Art*. 2nd ed. A K Peters / CRC Press, 2011, pp. 601–6.

Figure removed due to copyright restrictions.

Refer to: Fig. 13.32–39 from Lang, Robert J. *Origami Design Secrets: Mathematical Methods for an Ancient Art*. 2nd ed. A K Peters / CRC Press, 2011, pp. 601–6.

**I'd like to see more of the
triangulation algorithm**

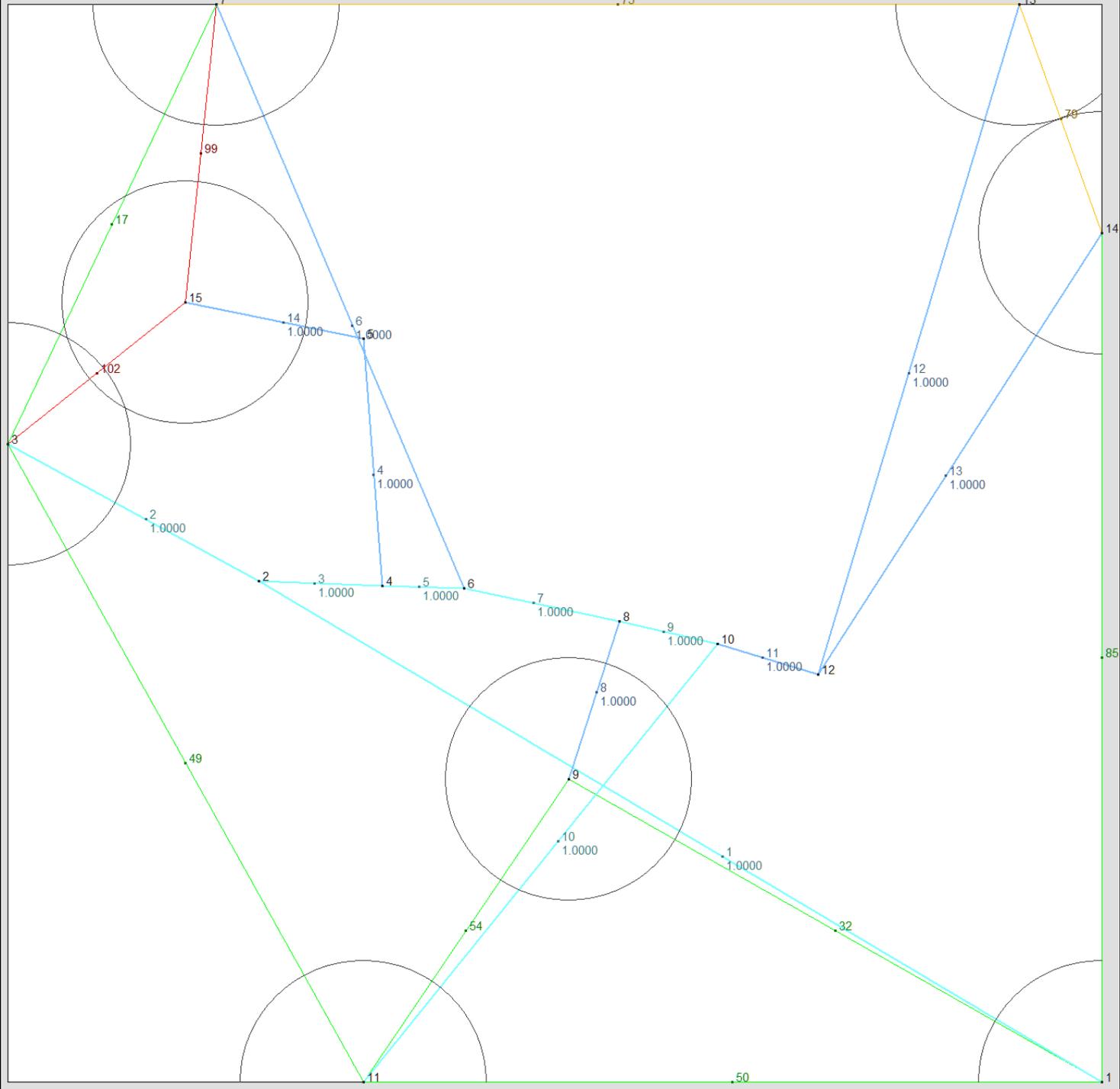


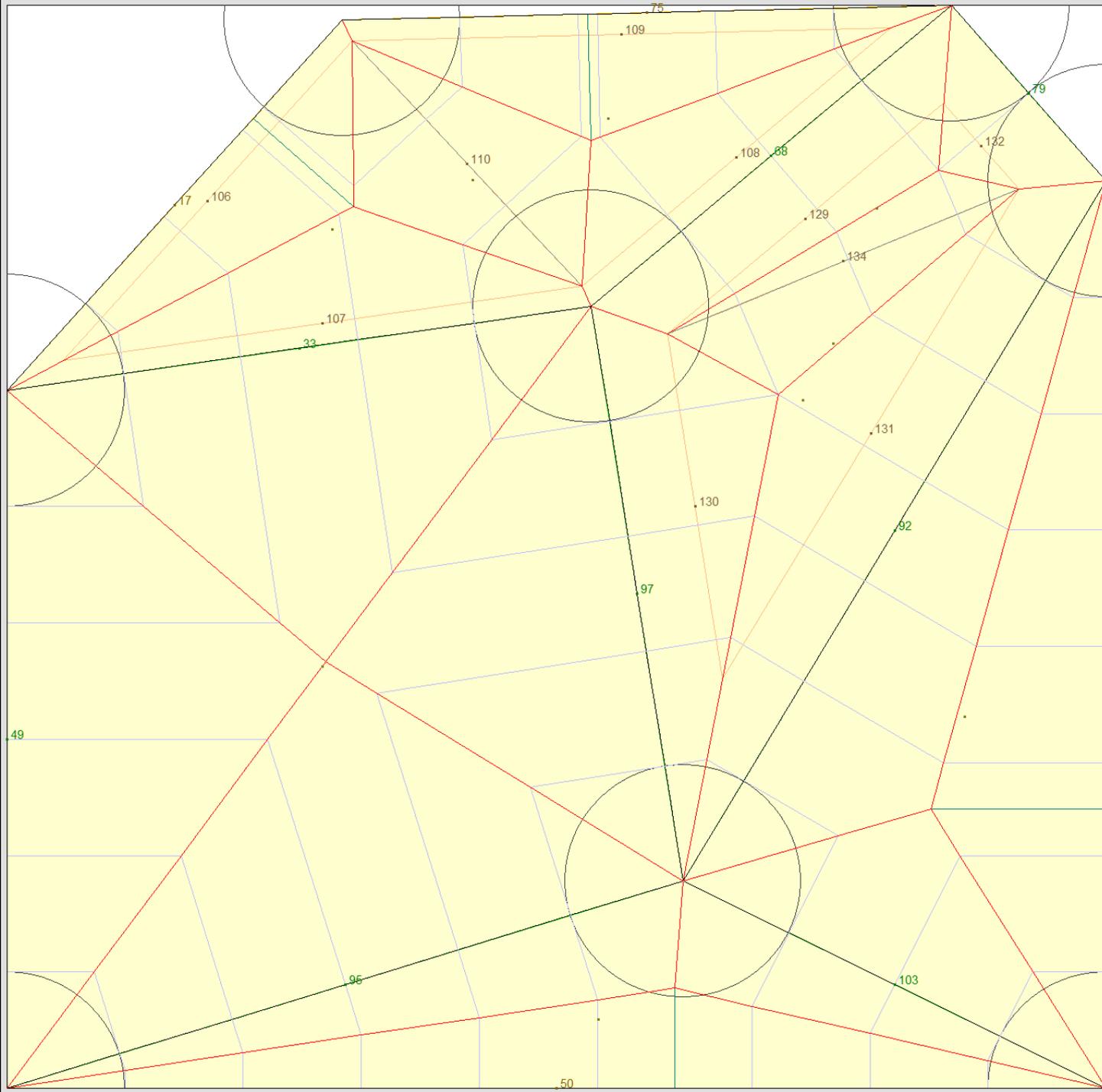


Note

 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

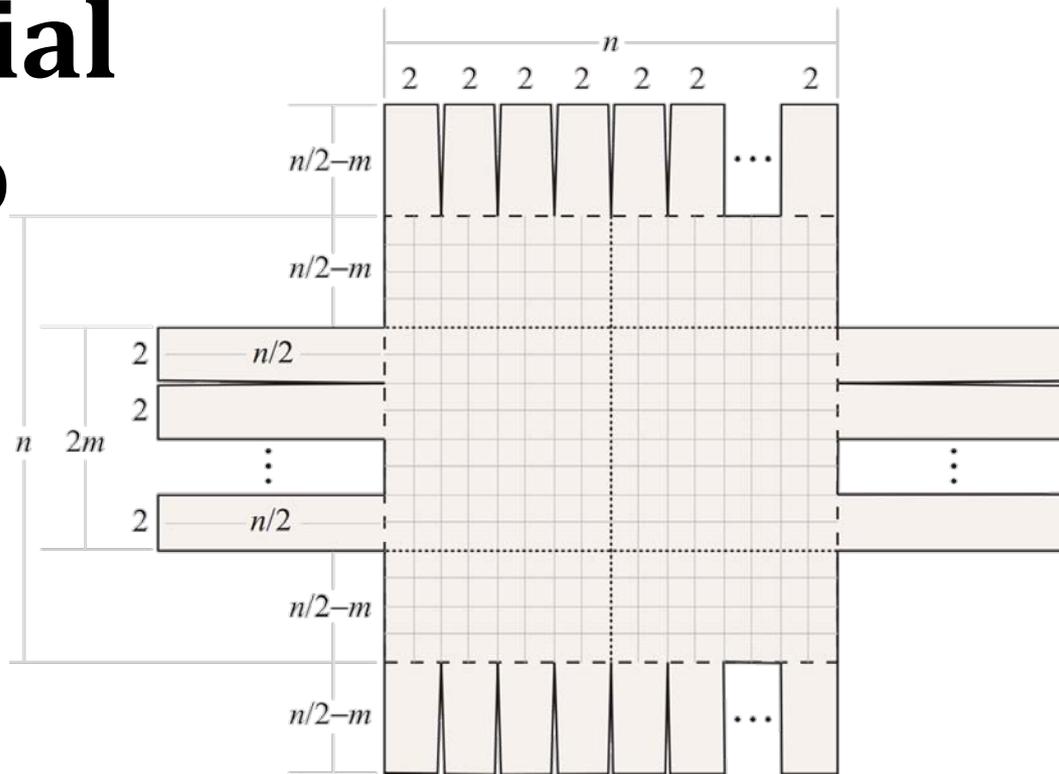




**I would like to understand
better how the Lang Universal
Molecule works.**

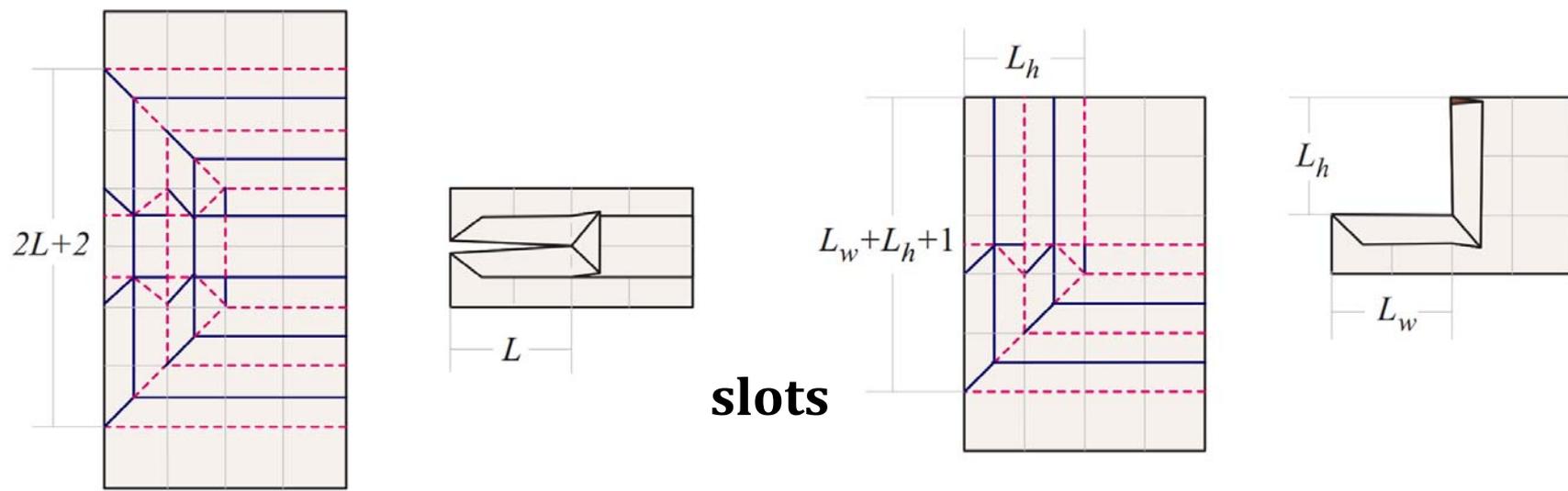
You mention a class of largely open problems where one tries to fold some 3D structure (such as a tetrahedron) optimally with a square of paper. Is there a name for this problem or some way to know what versions are open?

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?

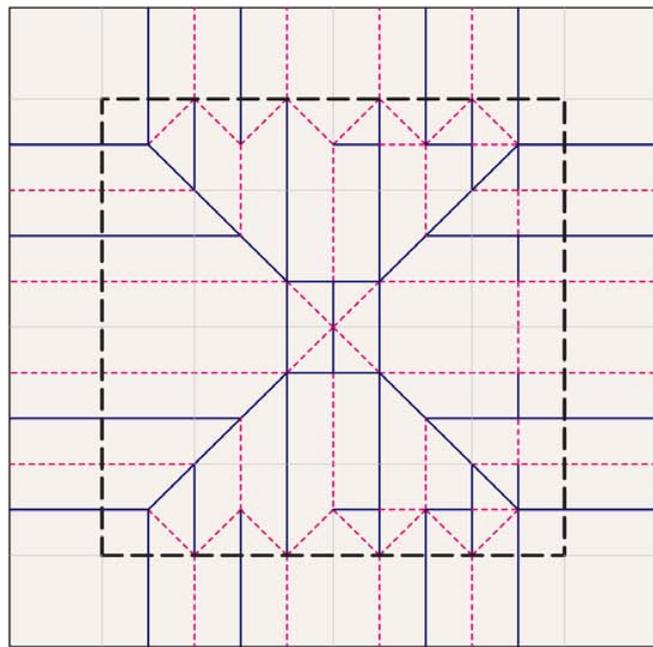


Demaine, Demaine,
Konjevod, Lang 2009

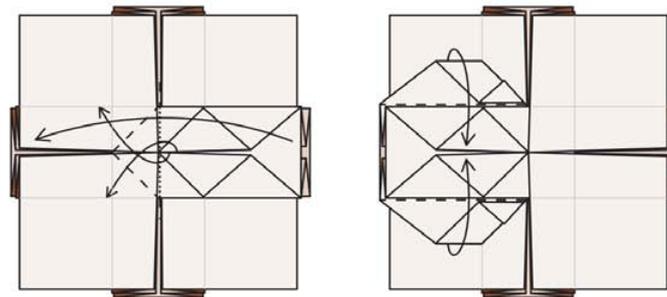
Courtesy of Erik D. Demaine, Martin L. Demaine, Goran Konjevod, and Robert J. Lang. Used with permission.



tab

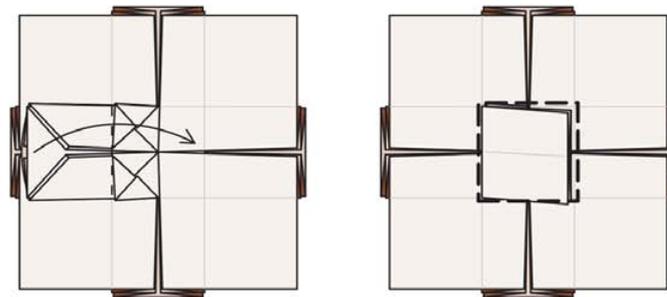


(a)



(b)

(c)

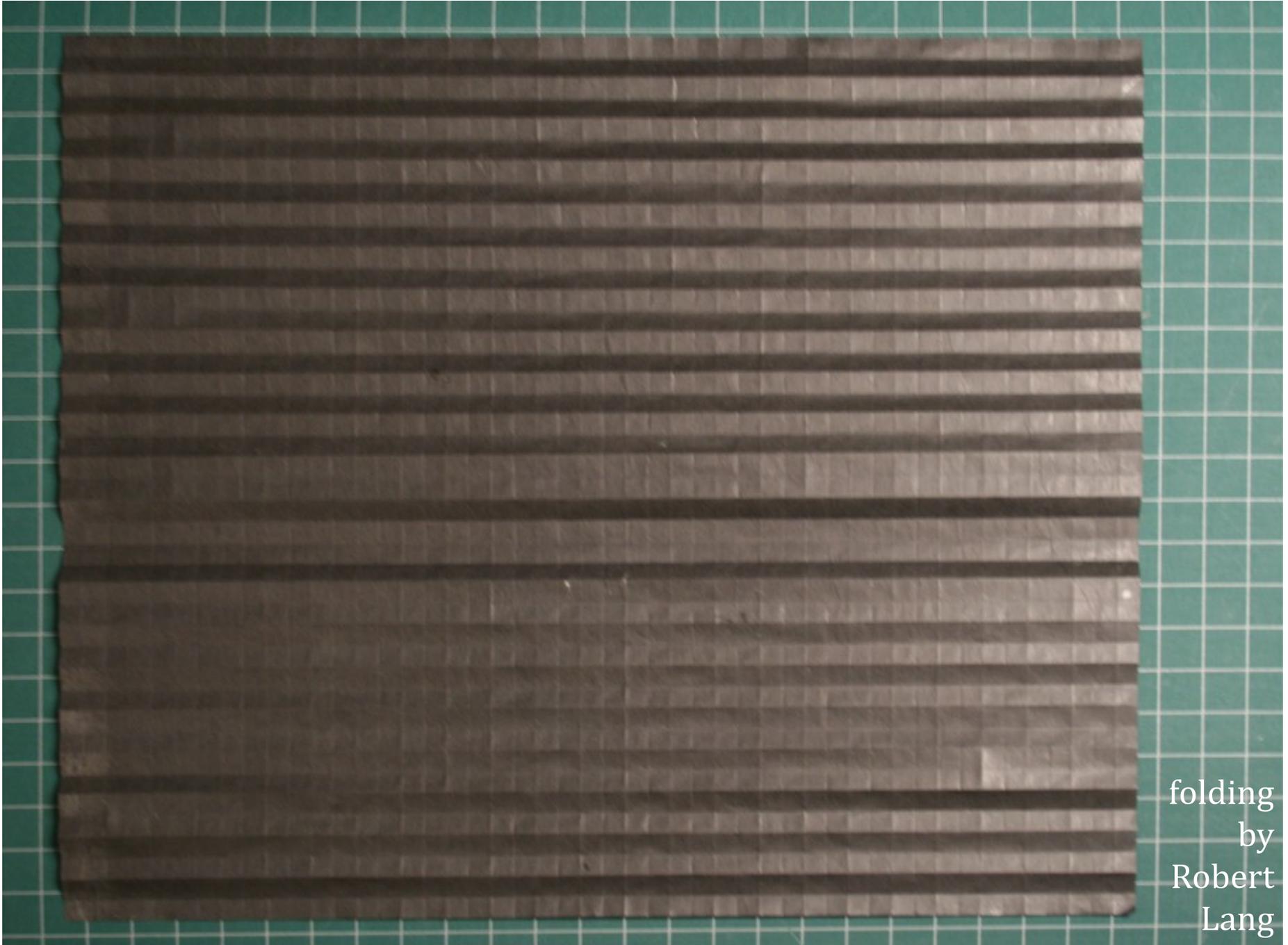


(d)

(e)

Courtesy of Erik D. Demaine, Martin L. Demaine, Goran Konjevod, and Robert J. Lang. Used with permission.

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



folding
by
Robert
Lang

Courtesy of Robert J. Lang. Used with permission.



folding
by
Robert
Lang

Courtesy of Robert J. Lang. Used with permission.



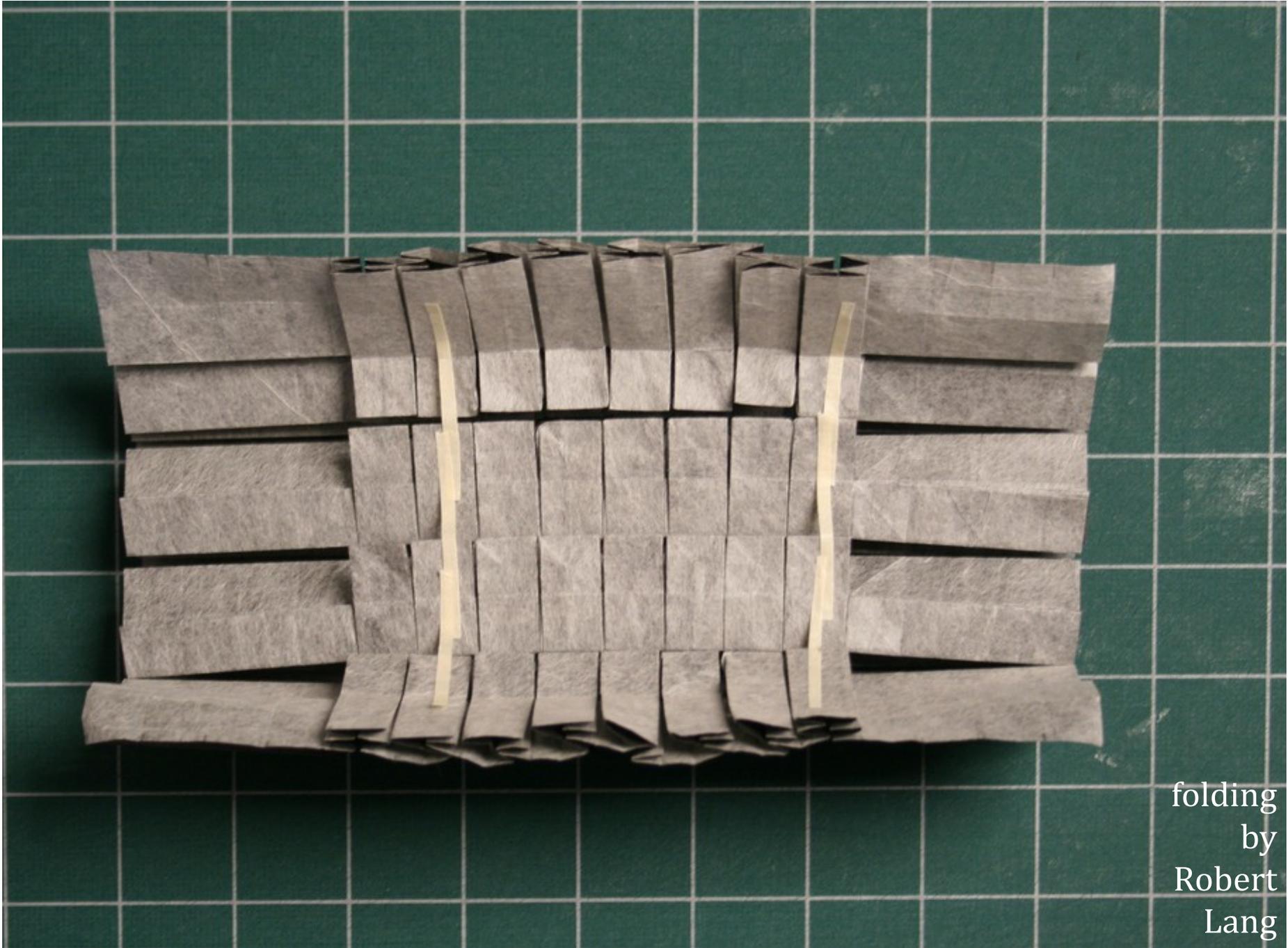
folding
by
Robert
Lang

Courtesy of Robert J. Lang. Used with permission.



folding
by
Robert
Lang

Courtesy of Robert J. Lang. Used with permission.



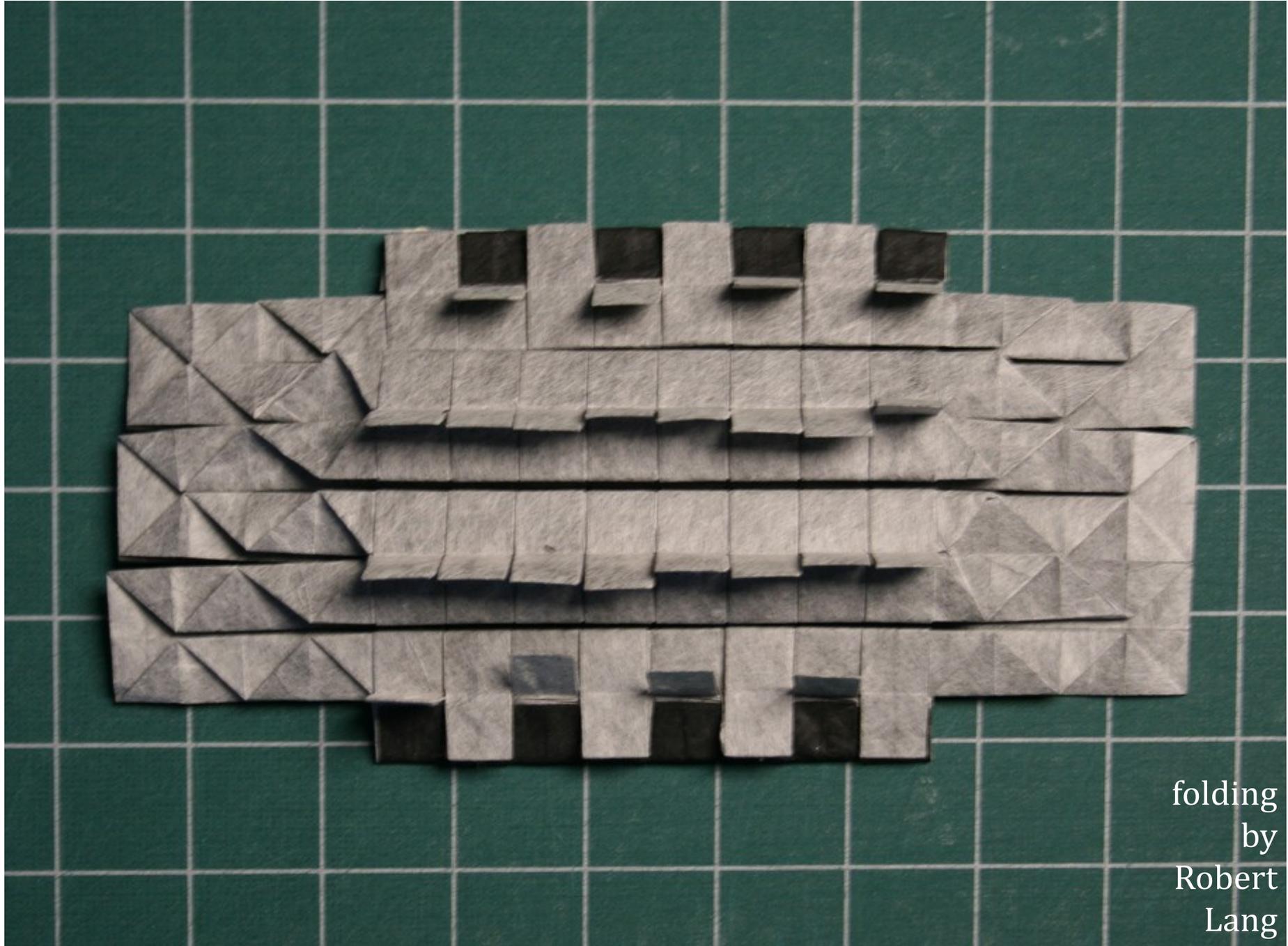
folding
by
Robert
Lang

Courtesy of Robert J. Lang. Used with permission.



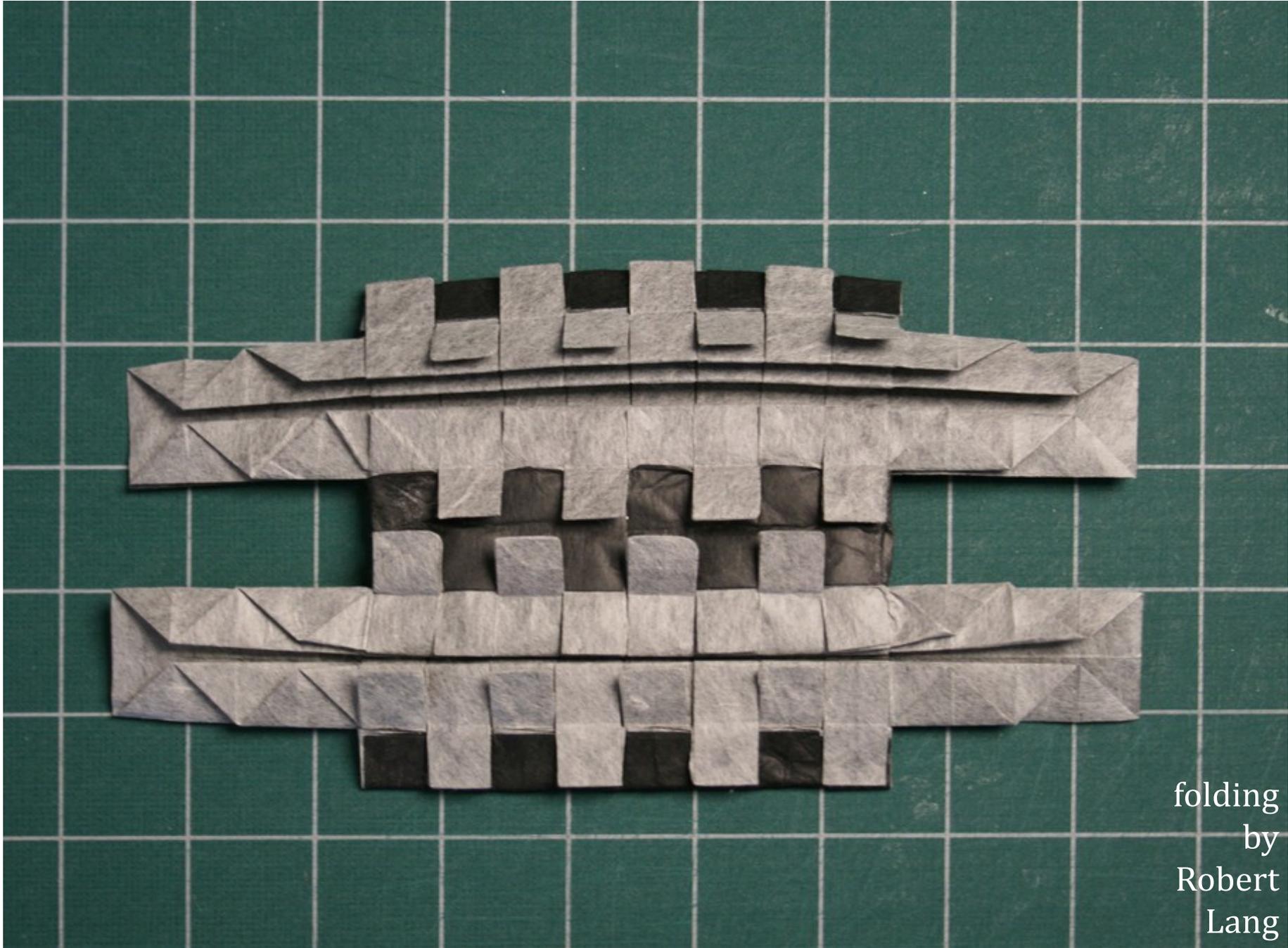
folding
by
Robert
Lang

Courtesy of Robert J. Lang. Used with permission.



folding
by
Robert
Lang

Courtesy of Robert J. Lang. Used with permission.



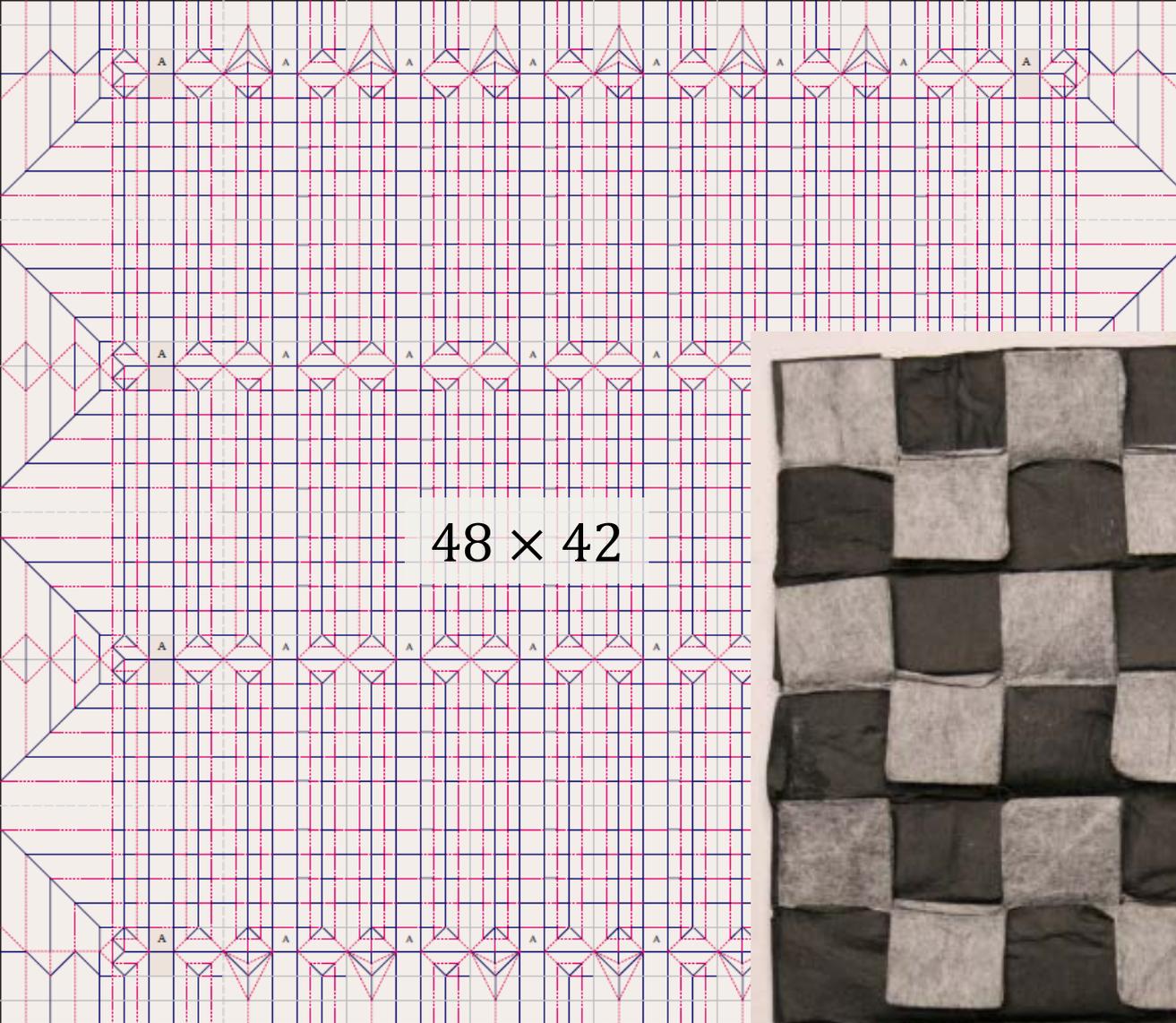
folding
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Lang

Courtesy of Robert J. Lang. Used with permission.

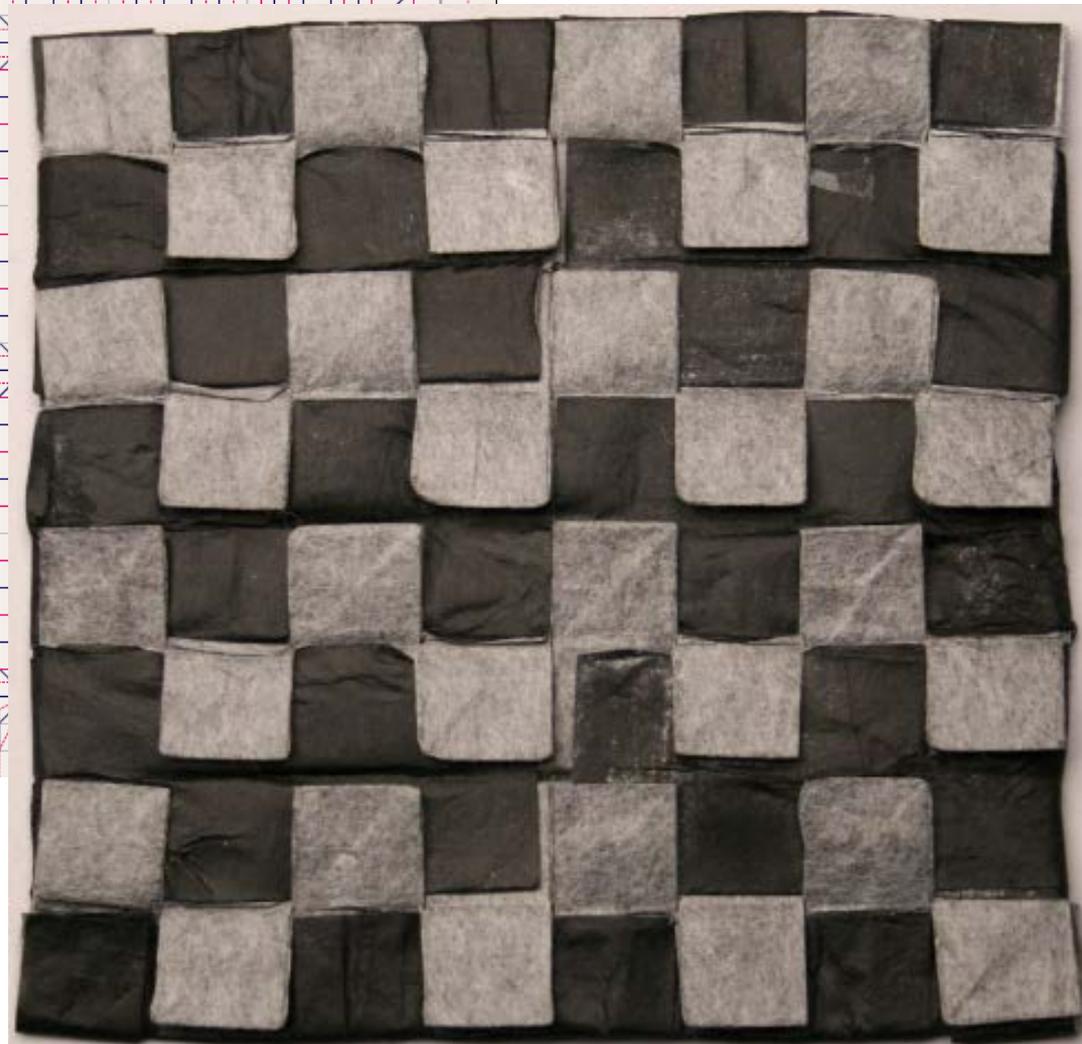


folding
by
Robert
Lang

[Demaine,
Demaine,
Konjevod,
Lang 2009]



48 × 42



“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?

Origamizing Polyhedral Surfaces

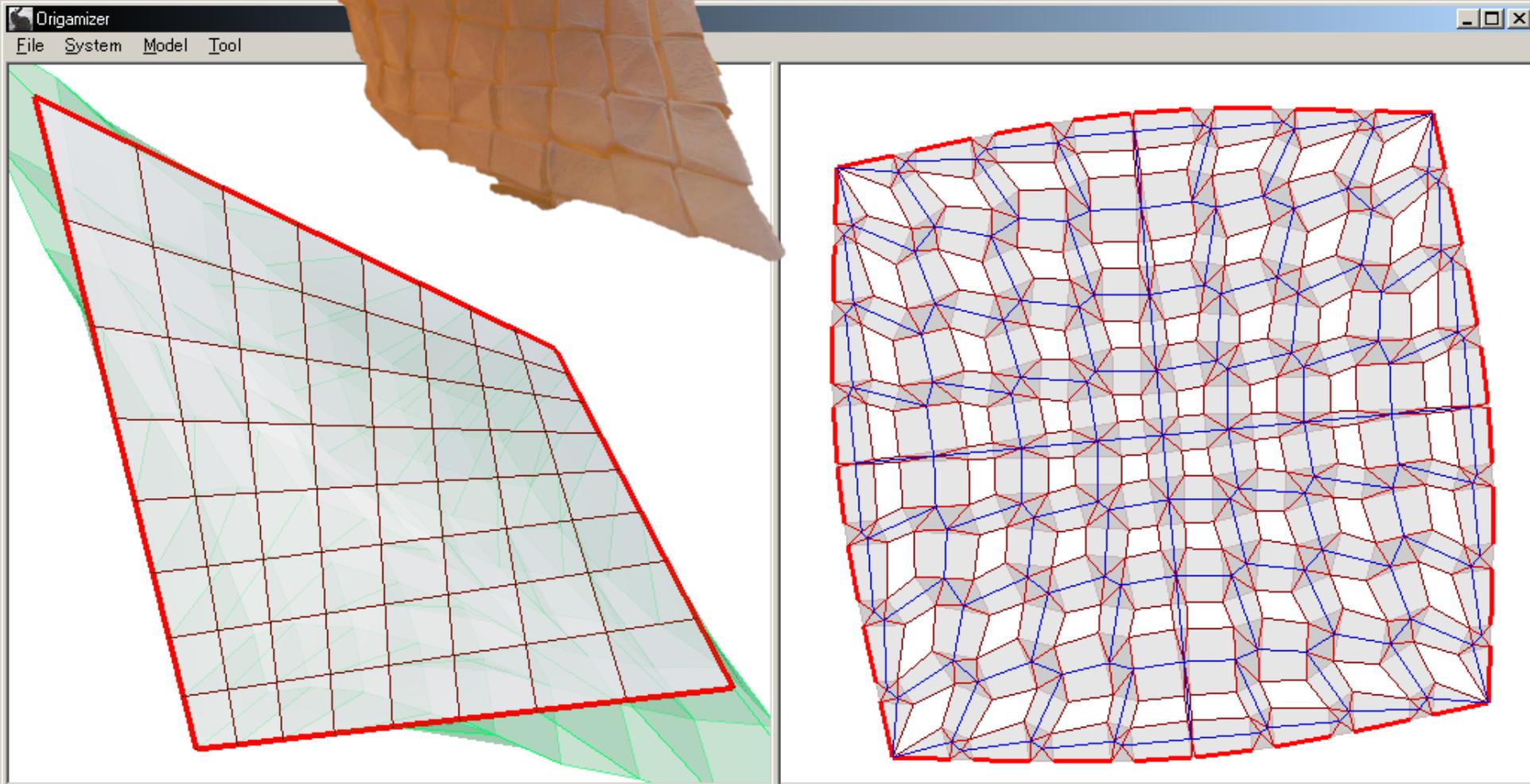
Tomohiro Tachi, *Student Member, IEEE*

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.



“Origamizer Screenshots for Hypar”
Tomohiro Tachi, 2007



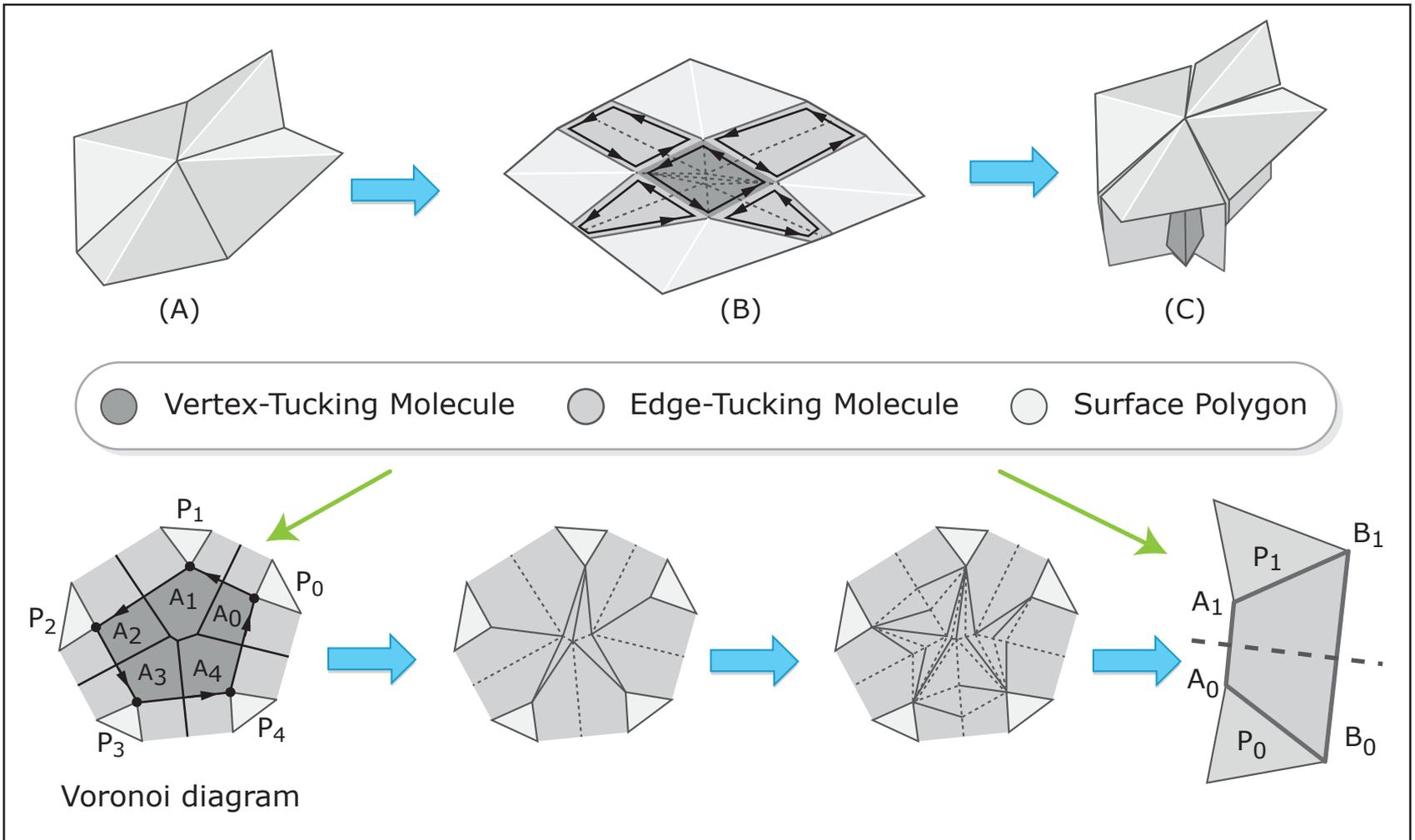


Image by MIT OpenCourseWare.

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...

MIT OpenCourseWare
<http://ocw.mit.edu>

6.849 Geometric Folding Algorithms: Linkages, Origami, Polyhedra
Fall 2012

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