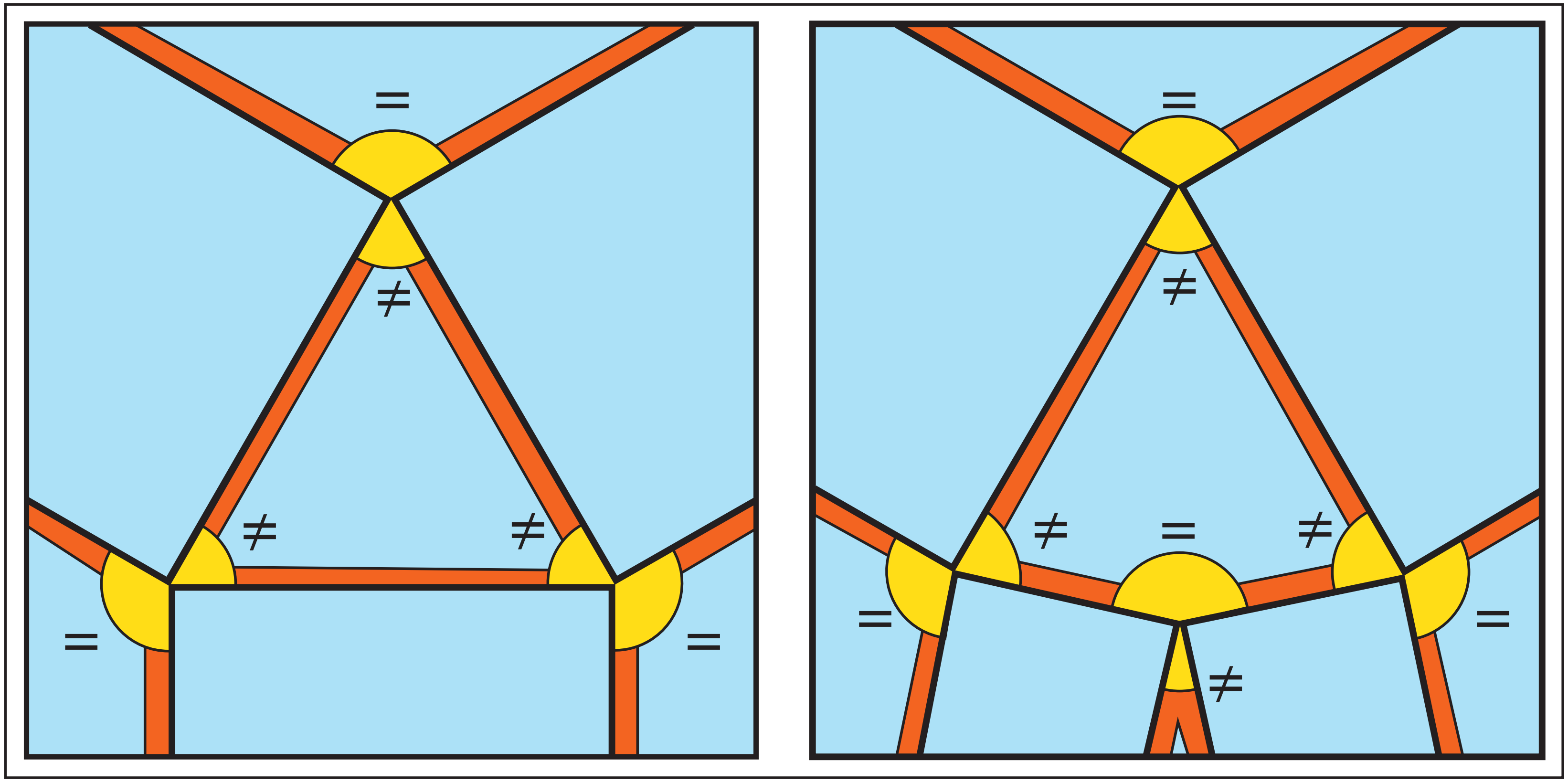
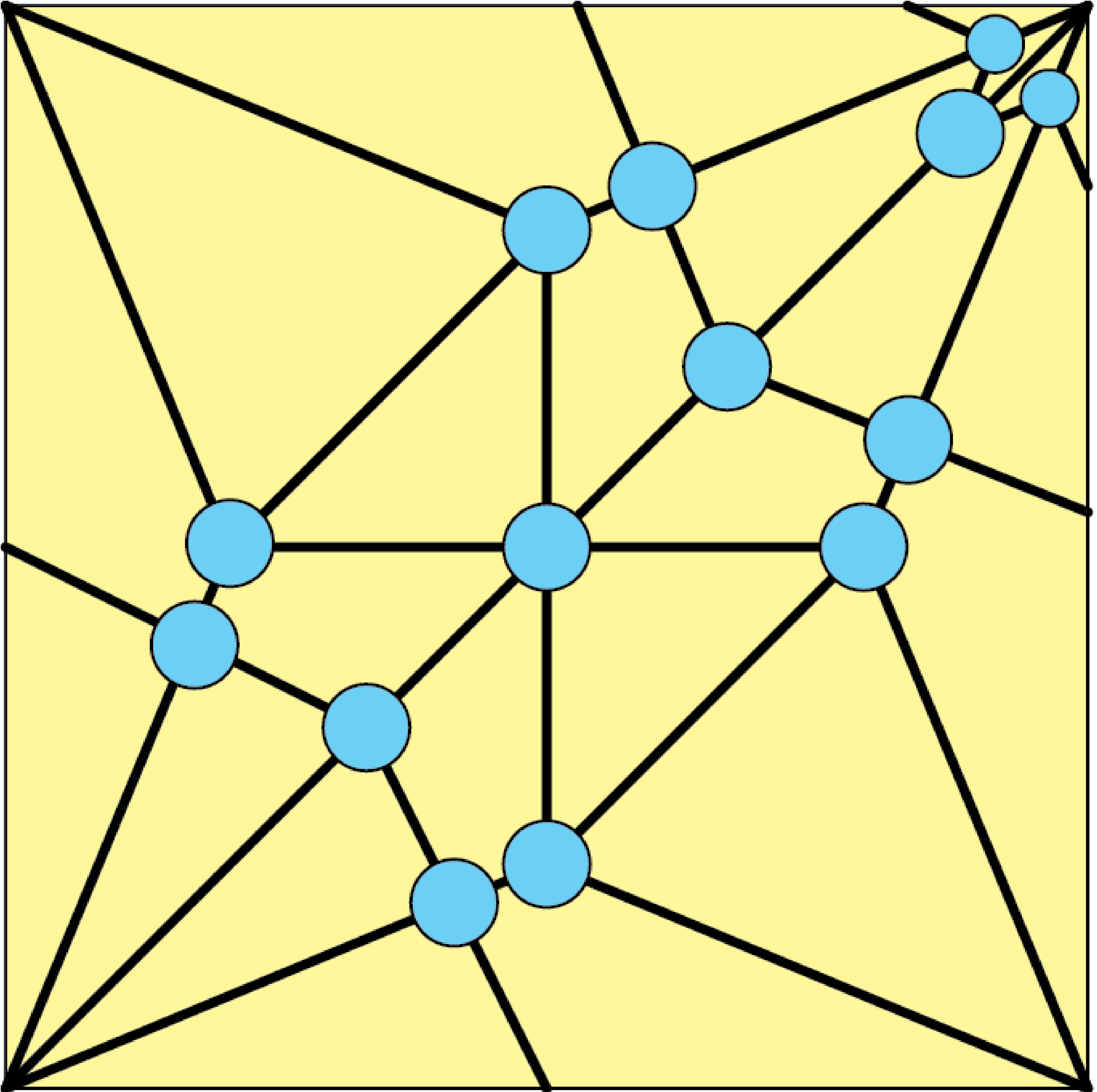
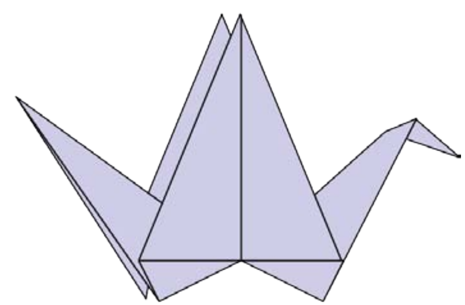
[...] you refer to a result from L2 that you can determine in linear time whether something folds flat. Is this referring to the mingling algorithm? I haven't thought about this in detail, but it appears to take something like quadratic time [...]

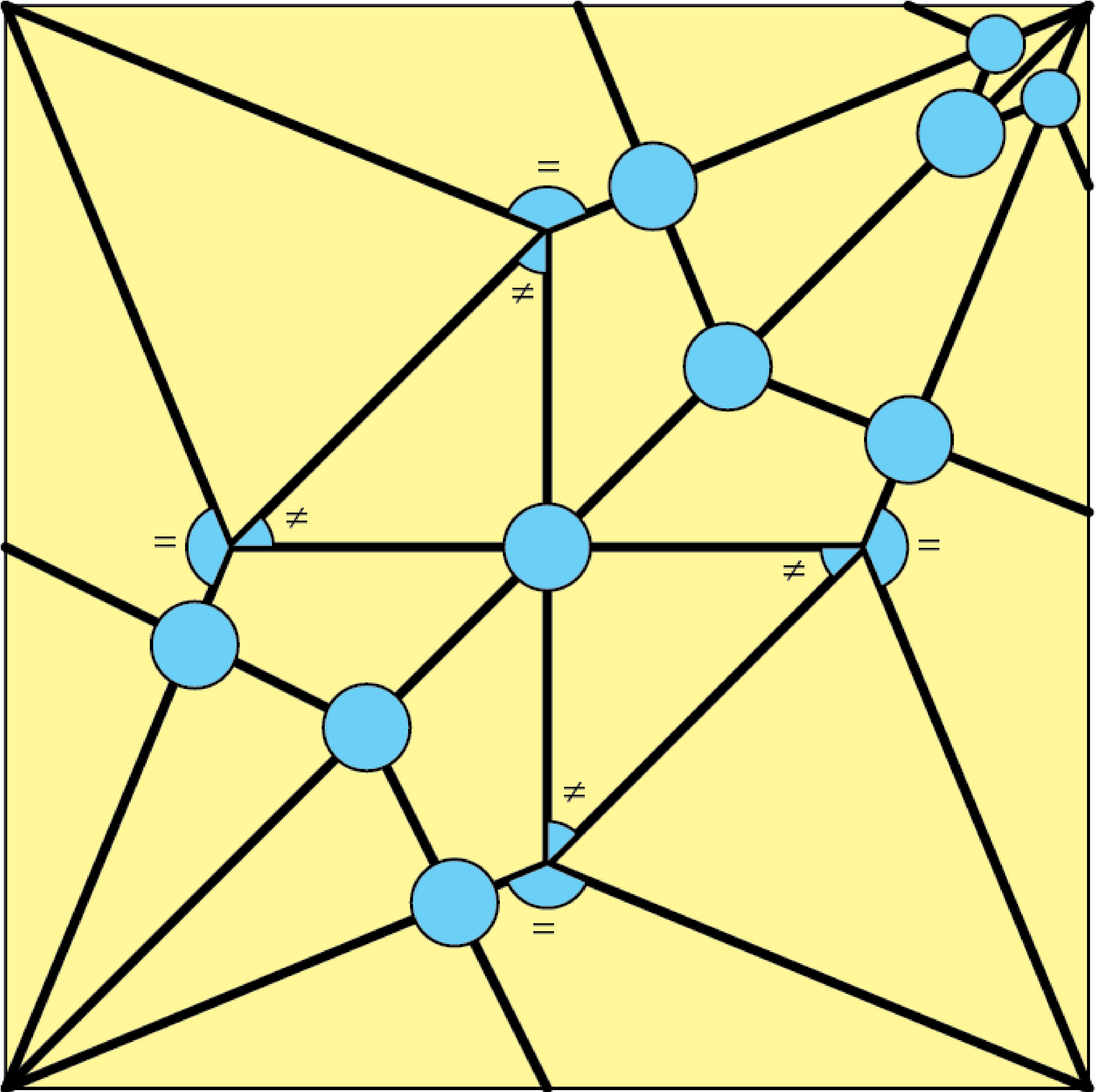
I was a tad confused on the local foldability algorithm. An example in class actually running the algorithm would probably clear it up.

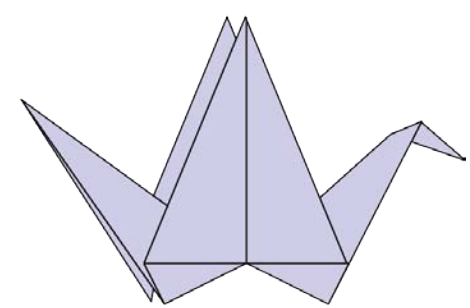
Can you clarify what you mean by a path or cycle?

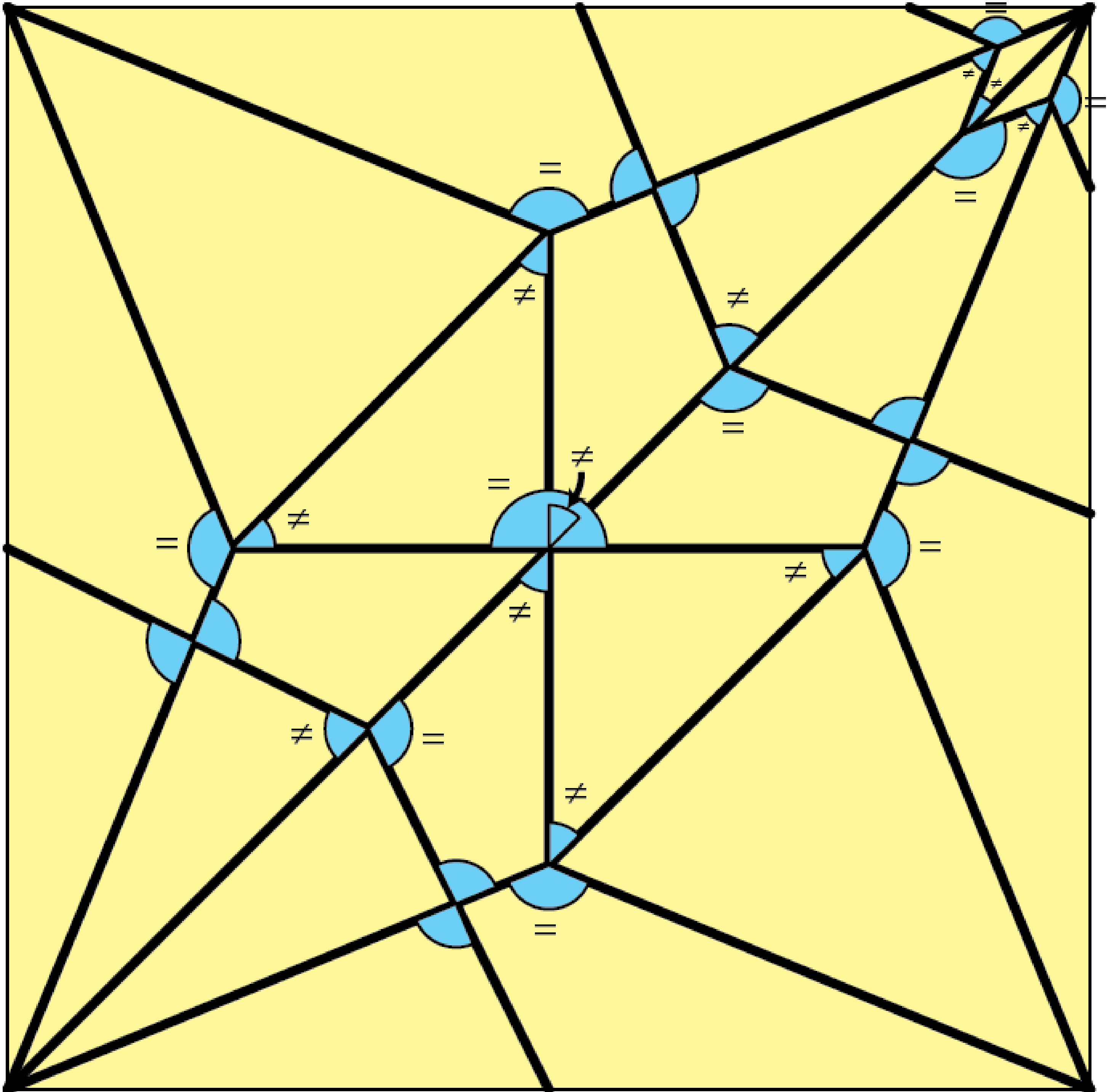


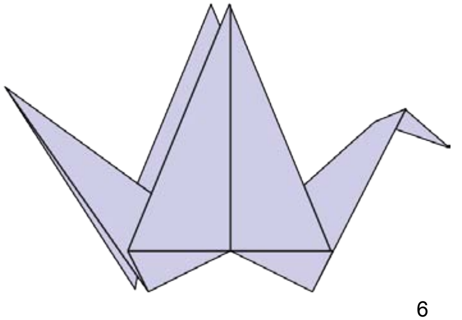


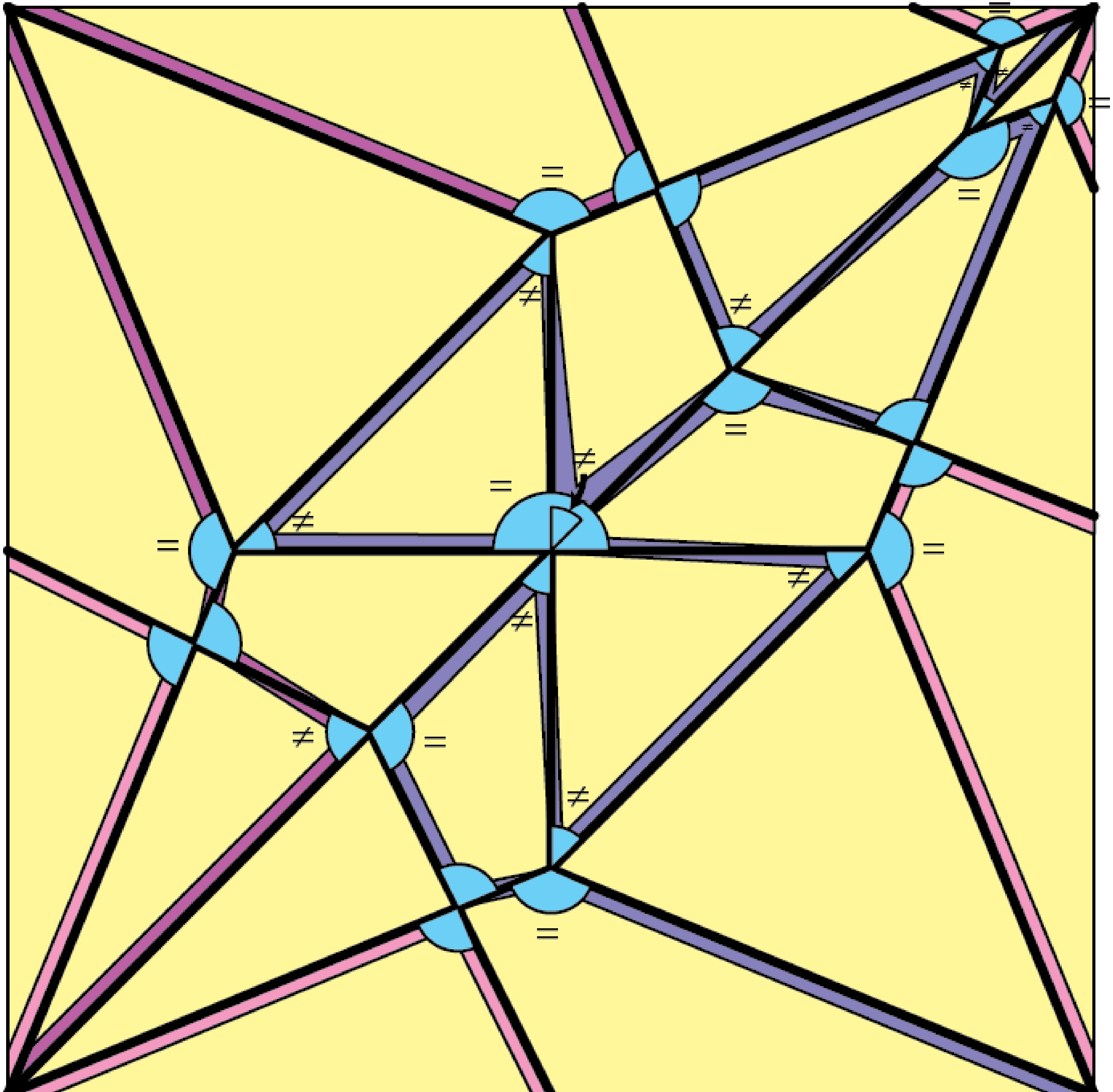


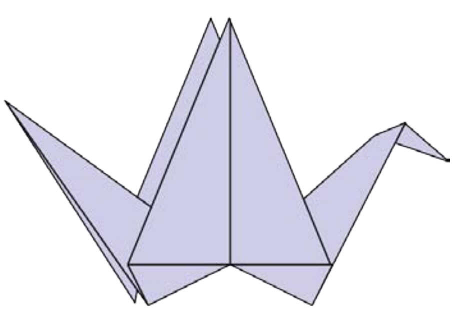












>360° cones could be made by fabric — perhaps you want to fold a garment along its seams, but the seamed sections meet in a point and the sum of the angles is greater than 360° (e.g., underarm of a shirt)

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If flat foldability is to fold a 2D sheet of paper in 2 dimensions, are there results for "flat foldability" in higher dimensions, i.e. to fold a *d*-dimensional sheet of paper in *d* dimensions? Can the result be generalized to higher dimensions?

Images removed due to copyright restrictions.

Refer to: Kawasaki, Toshikazu. "On High Dimensional Flat Origamis." *Proceedings of the First International Meeting of Origami Science and Technology* (1989): 131–41.

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1.2. Flat origamis of $\boldsymbol{R}^3$

Definition 1.2 (flat origamis of $\boldsymbol{R}^3$): A locally finite cell decomposition K of X is called a flat origami if for an arbitrary closed curve γ in X such that γ does not pass through any 0 or 1 −cell of K and intersects 2-celles $\sigma_1,..,\sigma_r$ of K transversally in this order, the flat condition holds:

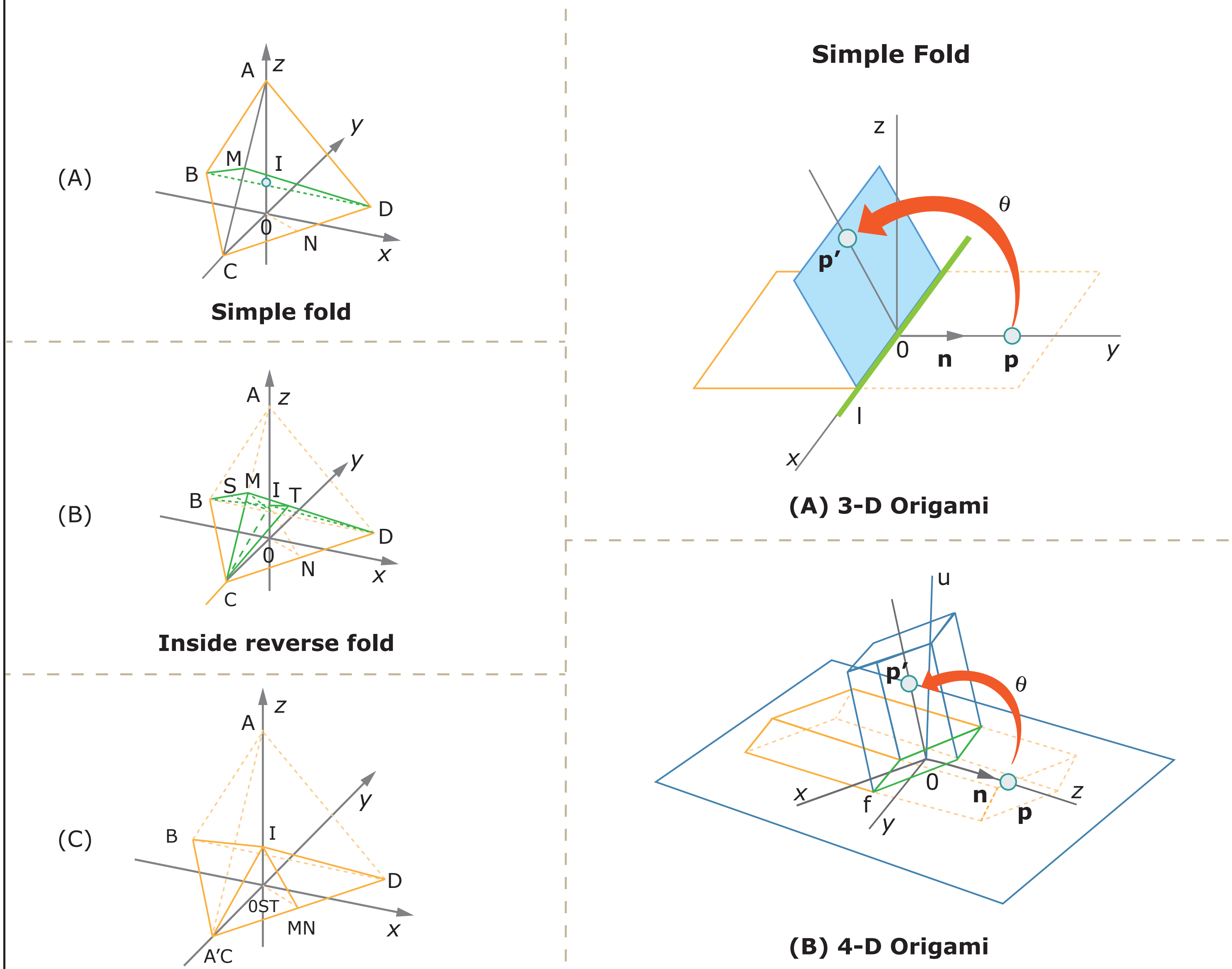
$$R(\sigma_1)\cdots R(\sigma_r)=\text{identity}.$$

Fig. 1.1, 1.2, 1.3 removed due to copyright restrictions.

Refer to: Kawasaki, Toshikazu. "On High Dimensional Flat Origamis." *Proceedings of the First International Meeting of Origami Science and Technology* (1989): 131–41.

Read the abstract: Inoue, A., R. Itohara, et al. "CG Image Generation of Four-Dimensional Origami." *The Journal of The Institute of Image Information and Television Engineers* 60 (2006):1630–47.

Folding of Regular Tetrahedron



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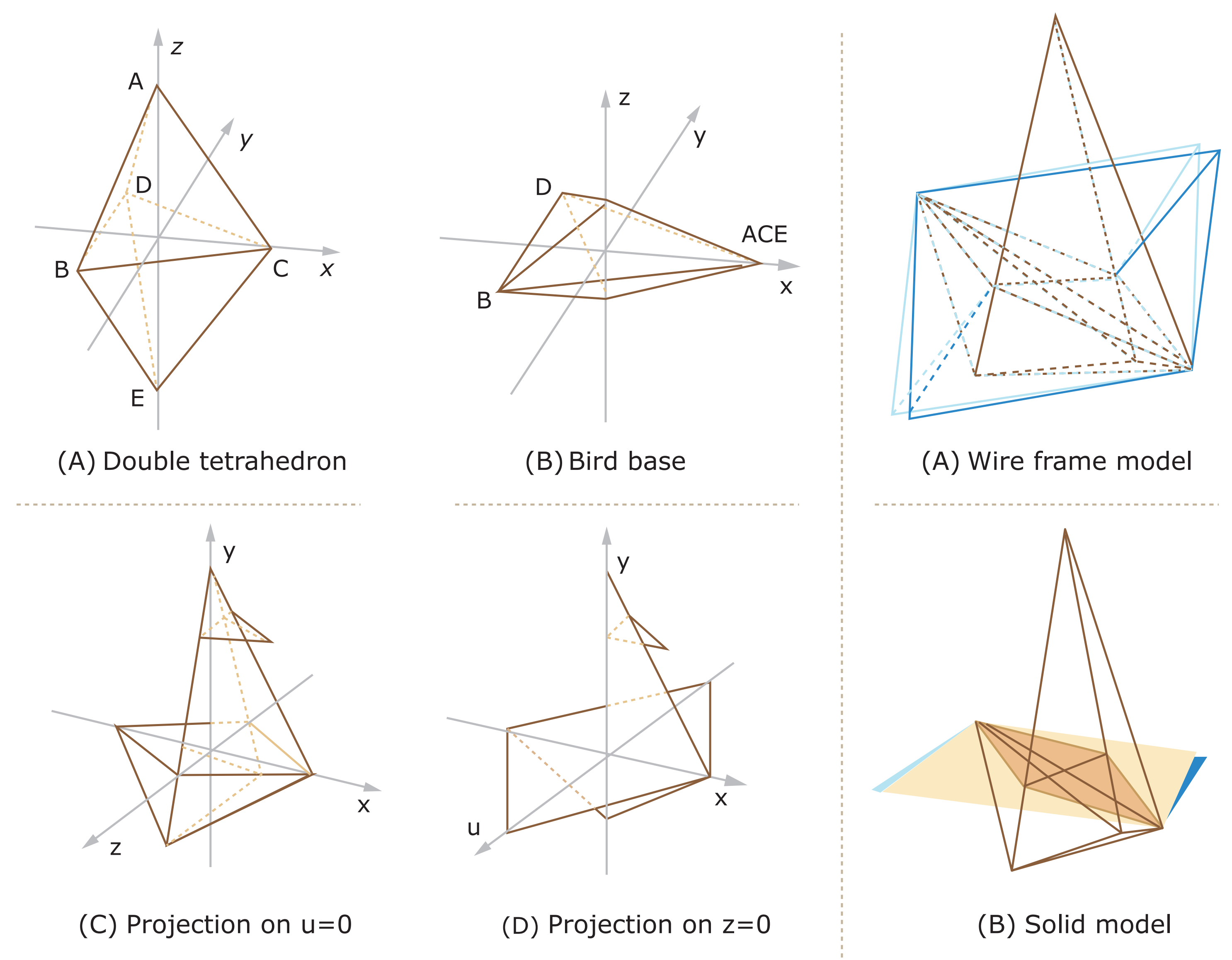
Refer to: Inoue, A., R. Itohara, K. Yajima, et al. "CG Image Generation of Four-Dimensional Origami." *The Journal of The Institute of Image Information and Television Engineers* 60 (2006): 1630–47.

Four-Dimensional Bird



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Refer to: Inoue, A., R. Itohara, K. Yajima, et al. "CG Image Generation of Four-Dimensional Origami." *The Journal of The Institute of Image Information and Television Engineers* 60 (2006): 1630–47.

We've spent a good chunk of time talking about flat foldability. What is the significance to this? Why is so much work done coming up with proofs and algorithms regarding this?

Photo courtesy of georigami on Flickr. Used with permission. Under CC-BY.

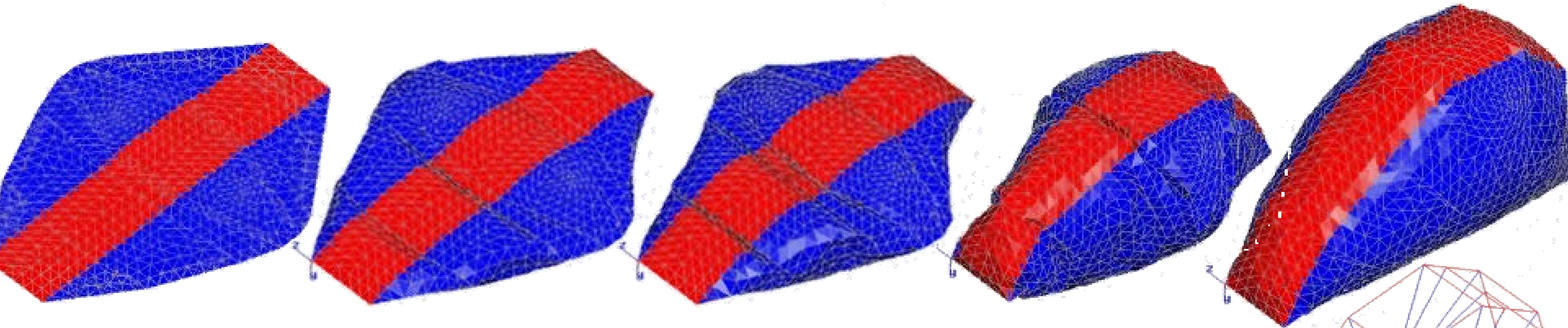
"Ralf Konrad's Rubik's Cube Tessellation"

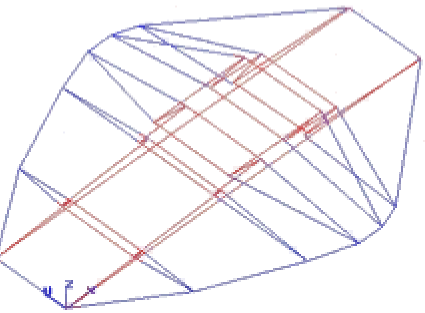
Jorge Jaramillo / georigami

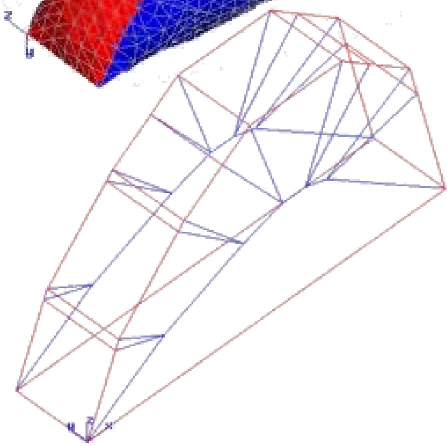
January 2007

Airbag Folding

[EASi Engineering]

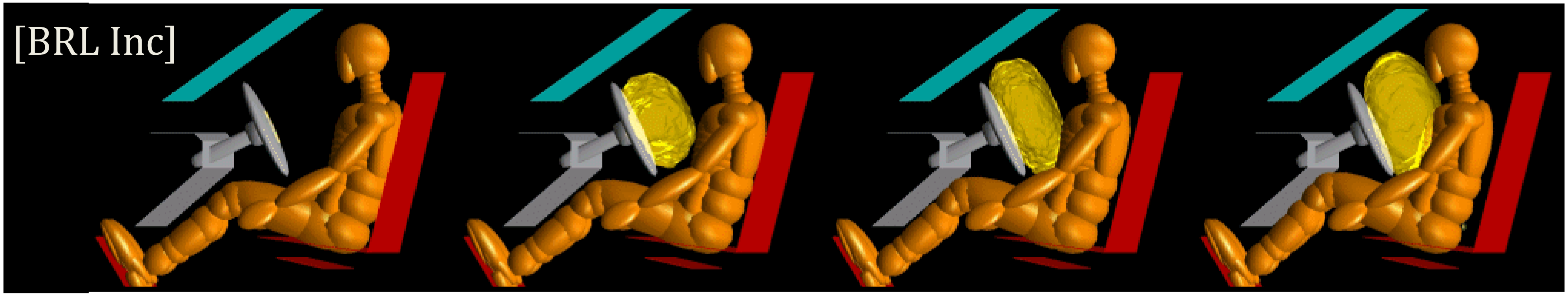






creases based on
computational origami design

Courtesy of EASi Engineering GmbH. Used with permission.

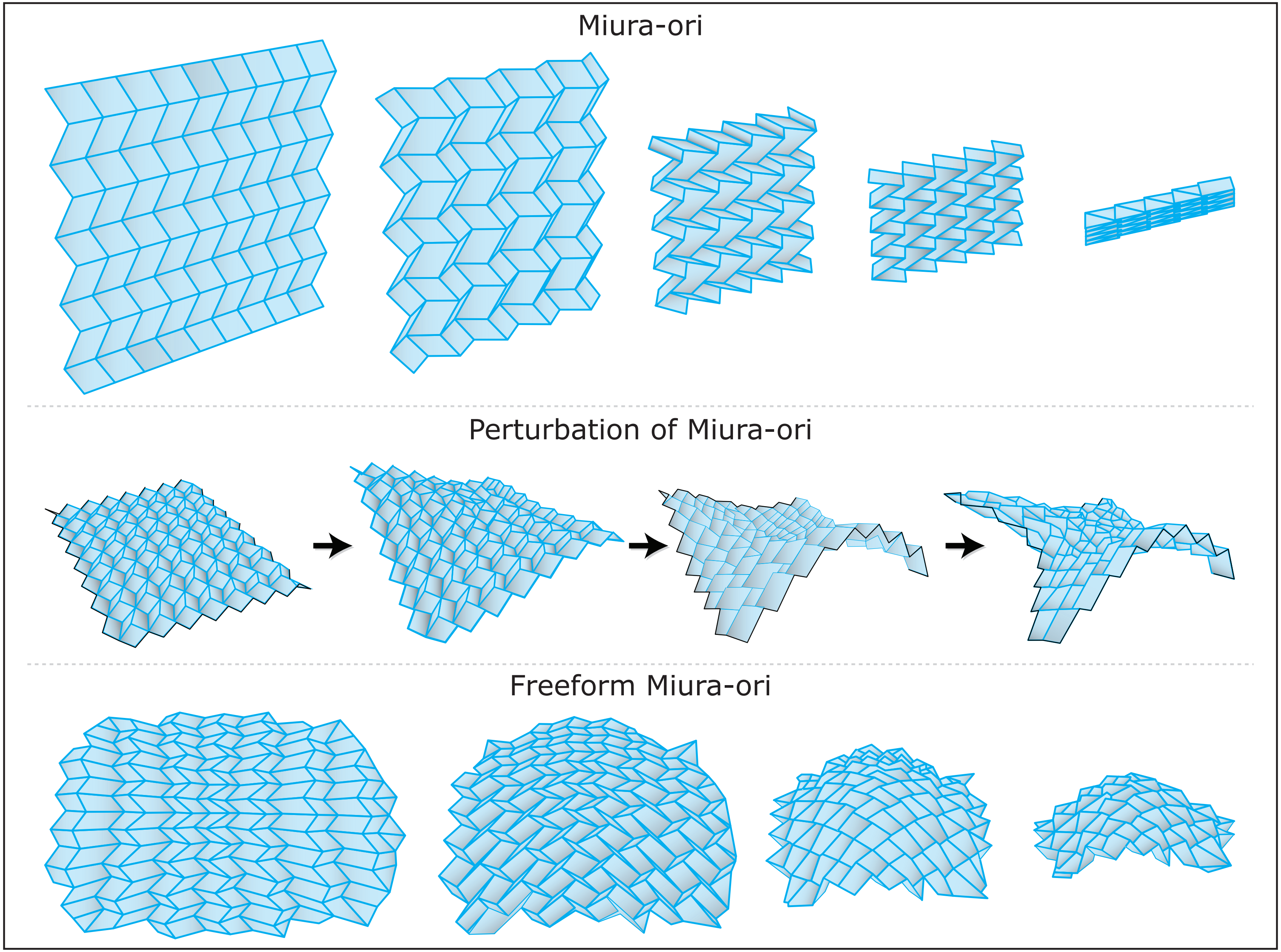


Proceedings of the International Association for Shell and Spatial Structures (IASS) Symposium 2009, Valencia
Evolution and Trends in Design, Analysis and Construction of Shell and Spatial Structures
28 September - 2 October 2009, Universidad Politecnica de Valencia, Spain
Alberto DOMINGO and Carlos LAZARO (eds.)

Generalization of Rigid Foldable Quadrilateral Mesh Origami

Tomohiro TACHI*
* The University of Tokyo
7-3-1 Hongo , Bunkyo-ku, Tokyo 113-8656, Japan

Theorem 2 *Any flat-foldable planar-quad mesh origami has rigid-folding motion if and only if there exists a non-trivial valid state, i.e., every foldline is folded ($\rho \neq 0$) but not completely folded ($\rho \neq \pi, -\pi$).*



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Refer to: Tachi, Tomohiro. "Generalization of Rigid Foldable Quadrilateral Mesh Origami." *Proceedings of the International Association for Shell and Spatial Structures (IASS) Symposium 2009*.

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