

## Origami-Inspired Folding of Thick, Rigid Panels

Hinges are used to achieve the necessary folding.

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To achieve power of 250 kW or greater, a large compression ratio of stowed-to-deployed area is needed. Origami folding patterns were used to inspire the folding of a solar array to achieve synchronous deployment; however, origami models are generally created for near-zero-thickness material. Panel thickness is one of the main challenges of origami-inspired design.

Three origami-inspired folding techniques (flasher, square twist, and map fold) were created with rigid panels and hinges. Hinge components are added to the model to enable folding of thick, rigid materials. Origami models are created assuming zero (or near zero) thickness. When a material with



A Membrane Backing enables the folding of a six-sided origami flasher with rigid panels.

finite thickness is used, the panels are required to bend around an increasingly thick fold as they move away from the center of the model. The two approaches for dealing with material thickness are to use membrane hinges to connect the panels, or to add panel hinges, or hinges of the same thickness, at an appropriate width to enable folding.

*This work was done by Brian P. Trease, Mark W. Thomson, Deborah A. Sigel, and Phillip E. Walkemeyer of Caltech; Shannon Zirbel and Larry Howell of Brigham Young University; and Robert Lang of Lang Origami for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1). NPO-48861*