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Time: 2:30 - 4:00 PM

Location: CBB 104

Origami Wrapping Patterns: Out of the Plane and towards Spacecraft Applications



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ABSTRACT:

Origami wrapping patterns take flat sheets of material and wrap them around a central hub. Structures based on such origami patterns have been advanced for deployable spacecraft elements, such as antennas and starshades. In this talk, we will explore two extensions of this idea to unfolded forms that are inherently non-planar: (1) corrugated polyhedral surfaces with non-zero angular defects at each vertex, and (2) smooth doubly-curved surfaces with curved creases. Structures based on these forms have applications as deployable spacecraft solar arrays and radio-frequency reflectors. We will discuss the design of algorithms to generate the forms and fold patterns, numerical models of structural performance, and physical realizations and testing. Finally, we will briefly assess their performance as spacecraft components.

BIOGRAPHY:

Manan Arya is an Assistant Professor in the Department of Aeronautics and Astronautics at Stanford University. There, he directs the Morphing Space Structures Lab, which develops and matures novel high-performance lightweight shape-changing spacecraft structures. Prior to joining Stanford, Manan was a Technologist at the Jet Propulsion Laboratory, California Institute of Technology. He received his PhD from the California Institute of Technology.