

Exploring T-hedral Origami across varied Topologies

Speaker: Kiumars Sharifmoghaddam

Abstract: Trapezoidal polyhedra (T-hedra), a generalization of discrete surfaces of revolution, represents a distinguished class of rigidly foldable discrete surfaces characterized by planar quad faces and rotational joints. Recent investigations have revealed that numerous renowned and practical origami patterns and foldable structures, fall within this class. Their ability to be explicitly constructed and isometrically deformed via a limited number of control polylines, coupled with their controlled one degree-of-freedom movement, make them suitable for interactive exploration by designers, architects and engineers. In this talk, we begin with their geometric construction, properties and deformation and introduce their semi-discrete counterpart. Then we navigate through the design space, showcasing a diverse array of examples across various topologies. From simple disc topologies to more complex cellular structures and toroidal arrangements.

This talk is formed from several collaborations within a research project supported by Grant F77 (SFB “Advanced Computational Design”) of the Austrian Science Fund FWF. Joint works are in collaboration with: Georg Nawratil, Arvin Rasoulzadeh, Jonas Tervooren, Rupert Maleczek, Khrystyna Vasylevska, Tobias Batik, Hugo Brument, Emanuel Vonach, Soroosh Mortezaipoor, Hannes Kaufmann, Tomohiro Tachi, Klara Mundilova and Munkyun Lee.