

Deployable strip structures

Speaker: Davide Pellis

Abstract: This talk introduces the new concept of C-mesh to capture kinetic structures that can be deployed from a collapsed state. Quadrilateral C-meshes enjoy rich geometry and surprising relations with differential geometry: A structure that collapses onto a flat and straight strip corresponds to a Chebyshev net of curves on a surface of constant Gaussian curvature, while structures collapsing onto a circular strip follow surfaces which enjoy the linear-Weingarten property. Interestingly, allowing more general collapses actually leads to a smaller class of shapes. Hexagonal C-meshes have more degrees of freedom, but a local analysis suggests that there is no such direct relation to smooth surfaces. Besides theory, this talk presents tools for exploring the shape space of C-meshes and for their design. We also present an application for freeform architectural skins, namely paneling with spherical panels of constant radius, which is an important fabrication-related constraint.