

On the design of discrete Voss nets and their generalizations

Speaker: Georg Nawratil

Abstract: Voss nets are surface parametrizations whose parameter lines follow a conjugate network of geodesics. Their discrete counterparts are flexible quadrilateral meshes with planar faces such that opposite angles at every vertex are equal.

We present interactive tools for the design of exact and approximate discrete Voss surfaces; we simulate the flexion of the approximate net and give a real-time visualization for the rigid-folding of the exact one. We also compare the results with the isometric deformation of a smooth Voss target surface.

Moreover, we discuss (a) the utilization of concave and even flipped quads in the design process and (b) the generalization of the vertex types of bi-directionally flat-foldable rigid origami. Finally, we drop the planarity condition of the faces and present the condition for a (3×3) building block of a discrete Voss surface composed of skew quads to be rigid-foldable.

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