

Title:

Principal Symmetric Structures

Organizers:

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Abstract:

This talk provides an overview of recent and ongoing research on gridshells whose structural elements are closely related to the curvature behavior of the surfaces they represent. We review structures that are aligned with principal curvature directions of the reference surface. They arise in connection with material minimizing forms and with the smoothest possible appearance of architectural skins covered by planar quadrilateral panels. We will then focus on quadrilateral layouts in which the supporting beams follow directions that are symmetric with respect to the principal curvature directions of the reference surface. Special cases include asymptotic gridshells which can be built by bending flat rectangular metal strips into curved support structures. We discuss geometric characterizations and applications of general principal symmetric quad structures and address static equilibrium. Finally, a path towards the generation of layouts which are symmetric with respect to principal stress directions is presented.