

Willmore energy minimizing PN triangles

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Abstract

PN triangle is a cubic Bézier surface that interpolates given spatial points and tangent planes at triangle vertices. Splines made from PN triangles are widely used in computer graphics due to their simple construction and desirable shape properties.

We show some modifications of PN triangles that minimize Willmore energy. Optimization is done in two separate steps. First, control points of every boundary curve are set to minimize its strain energy. Then the internal control point is optimized regarding discrete Willmore energy of a triangle. The construction depends on local data only. The optimization problem is easily solved and has a unique solution at mild presumptions. Some examples of surface reconstruction and restorations are presented.