

On Hermitian interpolation of first-order data with locally generated C^1 -splines over triangular meshes

By LÁSZLÓ L. STACHÓ (Szeged)

Abstract. Given a system of triangles in the plane $\mathbb{R}^2$ along with given data of function and gradient values at the vertices, we describe the general pattern of local linear methods involving only four smooth standard shape functions, which results in a spline function fitting the given value and gradient data value with C^1 -coupling along the edges of the triangles. We characterize their invariance properties with relevance for the construction of interpolation surfaces over triangularizations of scanned 3D data. The numerically simplest procedures among them leaving invariant all polynomials of 2-variables with degree 0 (resp. 1) involve only polynomials of 5-th (resp. 6-th) degree, but the characterizations give rise to a huge variety of procedures with non-polynomial shape functions.

LÁSZLÓ L. STACHÓ
DEPARTMENT OF NUMERICAL
AND APPLIED MATHEMATICS
BOLYAI INSTITUTE
UNIVERSITY OF SZEGED
ARADI VÉRTANÚK TERE 1
H-6720 SZEGED
HUNGARY
URL: <http://www.math.u-szeged/~stacho>

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