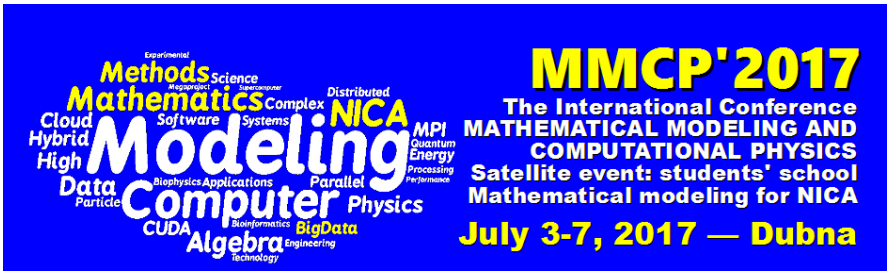

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Optimal approximation of biquartic polynomials by bicubic splines

Tuesday, 4 July 2017 14:00 (15 minutes)

Recently an unexpected approximation property between polynomials of degree three and four was revealed within a framework of two-part approximation models in 2-norm, Chebyshev norm and Holladay semi-norm. Namely, it was proved that if a two-component cubic Hermite spline's first derivative at the shared knot is computed from the first derivative of a quartic polynomial, then the spline is a clamped spline of class C^2 and also the best approximant to the polynomial.

Although it was known that a 2x2 component uniform bicubic Hermite spline is a clamped spline of class C^2 if the
derivatives at the shared knots are given by the first derivative of a biquaartic polynomial, however the optimality of such approximation remained an open question.

The paper's goal is to resolve this problem. Unlike the spline curves, in the case of spline surfaces it is insufficient to suppose that the grid should be uniform and the spline's derivatives computed from a biquartic polynomial. We show that the biquartic polynomial coefficients have to satisfy some additional constraints to achieve optimal approximation by bicubic splines.

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