Error estimates for harmonic and biharmonic interpolation splines with annular blocks

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The main result in this paper is an error estimate for interpolation biharmonic polysplines defined in an annulus $A(r_1, r_N)$, with respect to a partition by concentric annular domains $A(r_1, r_2)$, ..., $A(r_{N-1}, r_N)$, for radii $0 < r_1 < .... < r_N$. By definition these are C^2 functions which are piecewise biharmonic, and interpolating a sufficiently smooth data function on the spheres $|x| = r_j$ for $j = 1, ..., N$, see [1]. We consider polysplines which satisfy so-called natural boundary conditions on the external boundaries, i.e. for $|x| = r_1$ and $|x| = r_N$. By analogy with a technique in one-dimensional spline theory established by C. de Boor, we base our proofs on error estimates for harmonic interpolation splines with respect to the partition by the annuli $A(r_{j-1}, r_j)$. Details are available in [2].

Joint work with: Hermann Rener, Tsvetomir Tsachev.

References

[1] O. Kounchev. Multivariate Polsyplines. Applications to Numerical and Wavelet Analysis *Academic Press / Elsevier*, London-San Diego, 2001.

[2] O. Kounchev, H. Render, Ts. Tsachev Error estimates for harmonic and biharmonic interpolation splines with annular geometry *https://arxiv.org/abs/2201.05521*, submitted to a journal, 2022.