Bivariate Hierarchical Hermite spline
Quasi–Interpolation

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Quasi–Interpolation (QI) is a very general and powerful paradigm in approximation theory. In particular QI schemes based on splines are very popular because of the flexibility and reliability of spline functions. Here we are interested in a 2D adaptive extension of the 1D Hermite quasi–interpolation scheme based on B–splines which was introduced in [1] and has optimal approximation order. Now, in [2,3] a standard Tensor–Product (TP) 2D generalization of this scheme has been extensively tested and validated, proving the robustness of this approach also in the bivariate setting. However, it is clear that the TP formulation cannot be completely satisfactory when full adaptivity is required either to reduce the computational cost of the construction or to avoid possible artifacts in the approximant. Thus, following the general methodology recently introduced in [4], we discuss the hierarchical bivariate formulation of the above mentioned Hermite spline QI scheme, by exploiting the potential of the truncated basis introduced in [5]. Besides ensuring full adaptivity, the hierarchical approach allows us to consider only uniform grids at each refinement level. This implies that the analytic expression of the linear functionals defining the hierarchical QI operator can be precomputed with corresponding computational advantages.

References

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