

# Fast partition of unity interpolation through block-based data structures

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We propose new space-partitioning data structures for fast partition of unity interpolation [3] based on a partition of 2D and 3D domains in blocks. These computational procedures allow us to examine only a reduced number of blocks in the search process of the nearest neighbor points, thus producing a significant saving of time compared to the most advanced data structures such as the kd-trees [1,2]. Complexity analysis highlights advantages arising from the use of the new block-based partitioning structures associated with the resulting searching routines. Numerical results show good performances of our algorithms.

## References

- [1] R. CAVORETTO, A. DE ROSSI, *A meshless interpolation algorithm using a cell-based searching procedure*, Comput. Math. Appl. **67** (2014), pp. 1024–1038.
- [2] R. CAVORETTO, *A numerical algorithm for multidimensional modeling of scattered data points*, Comput. Appl. Math. **34** (2015), pp. 65–80.
- [3] H. WENDLAND, *Scattered data approximation*, Cambridge Monogr. Appl. Comput. Math., vol. 17, Cambridge Univ. Press, Cambridge, 2005.