XVIII INTERNATIONAL CONFERENCE ON HYPERBOLIC PROBLEMS
THEORY, NUMERICS, APPLICATIONS
Málaga, June 20-24, 2022

# One- and multi-dimensional CWENOZ reconstructions for implementing boundary conditions without ghost cells

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We address the issue of point value reconstructions from cell averages in the context of third order finite volume schemes, focusing in particular on the cells close to the boundaries of the domain. In fact, most techniques known in the literature (with the notable exception of [1] and related works) rely on the creation of ghost cells outside the boundary and on some form of extrapolation from the inside that, taking into account the boundary conditions, fills the ghost cells with appropriate values, so that a standard reconstruction can be applied also in boundary cells.

In [2], motivated by the difficulty of choosing appropriate boundary conditions at the internal nodes of a network, a different technique was explored that avoids the use of ghost cells, but instead employs for the boundary cells a different stencil, biased towards the interior of the domain.

Extending the approach of [2], which does not make use of ghost cells and relies on the adaptive-order CWENOZ reconstructions introduced in [3], we propose a more accurate reconstruction for the one-dimensional case and a two-dimensional one for Cartesian grids. In several numerical tests we compare the novel reconstruction with the standard approach using ghost cells.

## Acknowledgements

This research has been partially ...

## References

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