

A third order h-adaptive finite volume solver based on CWENO and the numerical entropy production

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This work is part of a project to construct high order h-adaptive finite volume scheme. Recently the idea of numerical entropy production [1] was extended to the case of balance laws [2] and this suggest to look for third order reconstruction procedure that can maintain its accuracy on non-uniform meshes.

In this respect, the Compact-WENO (CWENO) reconstruction of [3] is a more viable candidate than the traditional WENO reconstruction of third order. In fact, this latter relies on coefficients that depend on the mesh geometry and that would need to be recomputed after each mesh adaption step. Moreover, CWENO computes a reconstruction polynomial that is uniformly accurate in the whole cell and thus can be employed to compute a third order accurate reconstruction at interior points of the cell, which is needed for well-balanced quadratures. In this work, we extend the CWENO reconstruction to non-uniform meshes in one and two space dimensions and employ it in the construction of third order accurate h-adaptive schemes for conservation [2] and balance laws[2]. A short discussion on the role of the parameter appearing in the nonlinear weights will be provided [5]. Numerous tests compare the WENO and CWENO reconstructions and illustrate the behaviour of the resulting scheme.

References

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- [4] Coco, Russo, Semplice - *Adaptive Mesh Refinement for Hyperbolic Systems based on Third-Order Compact WENO Reconstruction* - <http://arxiv.org/abs/1407.4296> (Submitted to J. Sci. Comput.)
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