ADAPTIVE HIGH ORDER WELL BALANCED COMPACT APPROXIMATE METHOD FOR SYSTEMS OF CONSERVATION AND BALANCE LAW

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Compact Approximate Taylor (CAT) methods for systems of conservation laws were introduced by Carrillo and Parés in 2019. These methods, based on a strategy that allows one to extend high-order Lax-Wendroff methods to nonlinear systems without using the Cauchy-Kovalevskaya procedure, have arbitrary even order of accuracy $2p$ and use $(2p+1)$-point stencils, where p is an arbitrary positive integer. More recently in 2021 Carrillo, Macca, Parés, Russo and Zorío introduced a strategy to get rid of the spurious oscillations close to discontinuities produced by CAT methods. This strategy led to the so-called Adaptive CAT (ACAT) methods, in which the order of accuracy – and thus the width of the stencils – is adapted to the local smoothness of the solution. In this talk we discuss about the extension of CAT and ACAT methods to systems of balance laws. To do this, the source term is written as the derivative of its indefinite integral that is formally treated as a flux function. The well-balanced property of the methods is discussed and a variant that allows in principle to preserve any analytically stationary solution is presented.

References

[1] H. Carrillo and C. Parés *Compact approximate Taylor methods for systems of conservation laws* , Journal of Scientific Computing, 80 (2019), pp. 1832-1866.

[2] H. Carrillo, E. M., C. Parés, G. Russo and D. Zorío, *An order-adaptive Compact Approximate Taylor method for systems of conservation law*, Journal of Computation Scientific, (2021).

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