CENTRAL WENO SCHEMES THROUGH A GLOBAL AVERAGE WEIGHT

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Abstract. A novel central weighted essentially non-oscillatory (central WENO; CWENO)-type scheme for the construction of high-resolution approximations to discontinuous solutions to hyperbolic systems of conservation laws is presented. This procedure is based on the construction of a global average weight using the whole set of Jiang-Shu smoothness indicators [3] associated to every candidate stencil, based on a procedure similar to the one introduced in [2]. By this device one does not to have to rely on ideal weights, which, under certain stencil arrangements and interpolating point locations, do not define a convex combination of the lower-degree interpolating polynomials of the corresponding sub-stencils. Moreover, this procedure also prevents some cases of accuracy loss near smooth extrema that are experienced by classical WENO and CWENO [4] schemes. These properties result in a more flexible scheme that overcomes these issues, at the cost of only a few additional computations with respect to classical WENO schemes and with a smaller cost than classical CWENO schemes [1]. Numerical examples illustrate that the proposed CWENO schemes outperform both the traditional WENO and the original CWENO schemes.

Keywords: Finite difference schemes, central WENO schemes, global average weight.

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