HYBRID WENO METHOD WITH ANTI-DIFFUSIVE FLUX

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ABSTRACT

In this paper, we present a hybrid weighted essentially non-oscillatory (WENO) method with anti-diffusive flux for solving the hyperbolic conservation laws. The WENO scheme [1] is very popular method for problems having discontinuities. It shows a good resolution in shocks, but has a relatively poor resolution in contact discontinuities. Many researchers have been studied to enhance the resolution of contact discontinuities. Després and Lagoutiére [2] proposed the downwind scheme, which maintain the sharpness in linear advection. Bouchut [3] modified this scheme to satisfy the entropy condition. Xu and Shu [4] applied this scheme for the high order WENO scheme. The resulting scheme shows enhanced resolution at contact discontinuities. However, it requires more computational costs than the original WENO methods. The hybrid WENO schemes selectively adopt the high-order linear upwind scheme or the WENO scheme to avoid the local characteristic decompositions and calculations of the nonlinear weights in smooth regions. We developed the MVP troubled-cell indicator [5] which does not need any variable parameter to detect the discontinuities. In this paper, we adopt the anti-diffusive flux on only near discontinuities, also the high order linear upwind scheme on smooth regions. The results shows the good resolution with essential computational cost.

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