

Abstract Submitted
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A New Weighted-Integral Based High-Order Method LI-JUN XUAN, JIE-ZHI WU¹, Peking University, Beijing China — A weighted-integral based scheme (WIBS) has been constructed where the integrals of the function weighted by test functions are recorded as degree of freedoms (DOFs). The time evolution of DOFs is by stable Runge-Kutta method from the weak form of the original equation. At the boundary of every two cells, the function values are interpolated from the DOFs of the neighboring cells to calculate flux and volumetric integral in the weak form. The basic idea is to increase the order of interpolation by increasing both interpolating cells and DOFs simultaneously. The interpolation on more cells permits the use of WENO to capture discontinuity, while more DOFs can shrink the size of the interpolating stencil. The compactness of the reconstruction can increase the accuracy (especially for short waves) and fully retain it at boundary. Many existing schemes (e.g., FV, FE, FD, DG, SV, SD, Hermiter, etc.) can be viewed as special subclasses of WIBS. For 1-D hyperbolic conservation law systems, a high stability is found and the order of accuracy is perfectly held. A WENO-WIBS scheme has also been constructed to capture the discontinuity successfully. The results of WIBS for various benchmark problems are compared with those of 5th-order WENO.

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