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Symmetry preservation in WENO schemes ERSIN OZBENLI, PRAKASH VEDULA, The University of Oklahoma — Weighted essentially non-oscillatory (WENO) schemes are commonly used in numerical solution of hyperbolic PDEs and are especially known for their remarkable performance in simulation of problems containing strong discontinuities. Similar to most numerical schemes in CFD, WENO schemes are also usually constructed such that the primary focus is on the accuracy of the solution but not on Lie symmetry groups associated with PDEs underlying these schemes. We showed in our earlier works (e.g. *Ozbenli and Vedula, Journal of Computational Physics*, 349, 2017) how consideration of Lie groups in commonly used numerical schemes could potentially lead to significant improvements in the accuracy of numerical schemes, especially when error measures based on Lie symmetries are considered. In this study, we extend earlier works, based on equivariant moving frames, on Lie symmetry preservation in numerical schemes and present construction, analysis and application of invariant (or symmetry preserving) WENO schemes. Performance of the proposed invariant WENO schemes is evaluated via implementation to inviscid Burgers' equation and Euler equations. Preliminary results indicate that our proposed invariant WENO schemes generally perform better than their non-invariant counterparts.

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