Department of Mathematics

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Scientific Computing Seminar

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WENO Scheme with Subcell Resolution for Computing Nonconservative Euler Equations

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3:00 PM- 4:00 PM
Room 646 PGH

Abstract: Nonconservative hyperbolic systems are more difficult to approximate numerically than conservative ones. High order path–conservative schemes were developed in the literature for solving nonconservative hyperbolic systems in [1, 2], however, it has been demonstrated in [3] that this approach has some computational issues and shortcomings. In this work, a modified high order path-conservative scheme which is based on the high order finite volume WENO scheme with subcell resolution and utilizes the exact Riemann solver to catch the right paths at the discontinuities, has been developed to overcome these shortcomings. Application to one-dimensional compressible two–medium flows of nonconservative or primitive Euler equations is studied to show the effectiveness of this new approach.

1. Castro, M.J., Gallardo, J.M., Parés, C.: High order finite volume schemes based on reconstruction of states for solving hyperbolic systems with nonconservative products. Application to shallow-water systems. Math. Comput. 75, 11031134 (2006).
2. Castro, M.J., Fernández-Nieto, E.D., Ferreiro, A.M., Garcia-Rodriguez, J.A., Parés, C.: High order extensions of Roe schemes for two-dimensional nonconservative hyperbolic systems. J. Sci. Comput. 39, 67114 (2009).
3. Abgrall, R., Karni, S.: A comment on the computation of non-conservative products. J. Comput. Phys. 229, 27592763 (2010).