SESSION: Advances in Modeling, Simulation and Data Integration for Subsurface Reservoirs

An Eulerian-Lagrangian WENO Finite Volume Scheme for Advection Problems

Todd Arbogast

We develop a locally conservative Eulerian-Lagrangian finite volume scheme with the weighted essentially non-oscillatory property (EL-WENO) in one-space dimension. This method has the advantages of both WENO and Eulerian-Lagrangian schemes. It is formally high-order accurate in space (we present the fifth order version) and essentially non-oscillatory. Moreover, it is free of a CFL time step stability restriction and has small time truncation error. The scheme requires a new integral-based WENO reconstruction to handle trace-back integration. A Strang splitting algorithm is presented for higher-dimensional problems, using both the new integral-based and pointwise-based WENO reconstructions. We show formally that it maintains the fifth order accuracy. Numerical results are provided to illustrate the performance of the scheme and verify its formal accuracy.