

Wai Sun Don
Ocean University of China

**Space-Time Adaptive Hybrid WENO-Compact Finite Difference Scheme for
Hyperbolic Conservation Laws with High Order Shock Detectors**

A high order/resolution space-time adaptive hybrid scheme that conjugates a nonlinear WENO finite difference scheme and a linear compact finite difference scheme will be described. The hybrid scheme takes advantages of the sharp essentially non-oscillatory capturing of shocks and high gradients of the WENO reconstruction procedure while reducing the inherent strong dissipation, and high resolution and non-dissipative nature of the compact scheme for efficient capturing of small scale structures. By treating the solution frozen in time as an image at each third order explicit TVD Runge-Kutta step, high order shock detection algorithms such as the polynomial based multi-resolution analysis by Harten, and non-polynomial based radial basis function analysis will be presented. Their performances in terms of accuracy, efficiency and robustness will be illustrated via several benchmark shocked flows, such as the one-dimensional shock-density wave interaction, two-dimensional classical Riemann initial value problem and the Mach 10 double Mach reflection problem.