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On the Use of Non-Staggered Central Schemes for Large Eddy Simulation of the Canonical Shock-Turbulence Interaction ROZIE ZANGENEH, Prairie View AM University,TX,USA — The objective of this study is to investigate the ability of the semi-discrete, non-staggered central scheme to capture the shock with adequately low dissipation for the minimum influence of Large Eddy Simulation (LES) of turbulent flows. To this end, high-resolution LES simulations are performed to study the interaction of a stationary shock with fully developed turbulent flows. The presence of discontinuities, such as shocks and contact surfaces, in high-speed compressible flows with interactions of shear driven turbulence, requires dissipation numerical schemes that can capture flow discontinuity at the shock while capturing broadband spatial and temporal variations in a turbulent flow suggests the use of high-bandwidth schemes with minimal dissipation and dispersion. The existing methods such as ENO, WENO, and RKDG method typically involve Riemann solvers, characteristic decomposition and Jacobian evaluation, making them complex and difficult to implement in a collocated polyhedral framework. Here, a central scheme which developed by Nessyahu and Tadmor is introduced as an alternative approach for an accurate, non-oscillatory solution which unlike the existing methods, does not involve Riemann solvers or characteristic decomposition, therefore can avoid Jacobian evaluation.

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