

Meeting: 1003, Atlanta, Georgia, SIAMMINI 2, SIAM Minisymposium on Discontinuous Galerkin Methods: Theory and Applications

1003-65-1557 **Yingjie Liu*** (yingjie@math.gatech.edu), School of Mathematics, Georgia Institute of Technology, Atlanta, GA 30332. *Central Schemes and Central Discontinuous Galerkin Methods on Overlapping Cells*. Preliminary report.

The central scheme of Nessyahu and Tadmor (JCP 90) has the benefit of not having to deal with the solution within the Riemann fan for solving hyperbolic conservation laws and related equations. But the staggered averaging causes large dissipation when the time step size is small comparing to the mesh size. The recent work of Kurganov and Tadmor (JCP 2000) overcomes the problem by use of a variable control volume and obtains a semi-discrete non-staggered central scheme. Motivated by this work, we introduce overlapping cell averages of the solution at the same discrete time level, and develop a simple alternative technique to control the $O(1/dt)$ dependence of the dissipation. Semi-discrete form of the central scheme can also be obtained. The overlapping cell representation of the solution also opens new possibilities for reconstructions. Overlapping cells create self similarity in the grid and enable the development of central type discontinuous Galerkin methods for convection diffusion equations and elliptic equations with convection, following the series works of Cockburn and Shu (Math. Comp. 89). (Received October 05, 2004)