1109-65-227 **Yulong Xing*** (xingy@math.utk.edu), Knoxville, TN 37996. *Well-balanced discontinuous Galerkin methods for the Euler equations under gravitational fields.*

Hydrodynamical evolution in a gravitational field arises in many astrophysical problems. It is essential to correctly capture the effect of gravitational force in the simulations, especially if a long-time integration is involved, for example in modeling star and galaxy formation. Improper treatment of the gravitational force can lead to a solution which either oscillates around the equilibrium, or deviates from equilibrium after a long time run. In this presentation, we propose a recently developed well-balanced discontinuous Galerkin method for the Euler equations under gravitational fields. The hydrostatic equilibrium state for the Euler equations, such as zero flow velocity, can be precisely kept by the proposed scheme up to the machine error. Some numerical tests are performed to verify the well-balanced property, high-order accuracy, and good resolution for smooth and discontinuous solutions. (Received February 02, 2015)