Maximum Principle of Arbitrary Lagrangian-Eulerian Discontinuous Galerkin Methods for Conservation Laws

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In this talk, we present the arbitrary Lagrangian-Eulerian discontinuous Galerkin (ALE-DG) methods for conservation laws. The method will be designed for simplex meshes. This will ensure that the method satisfies the geometric conservation law for any time integration method with the accuracy order at least the same as patial dimension. For the semi-discrete method the L^2-stability and the suboptimal $(k+1/2)$ convergence with respect to the $L^1(0;T;L^2)$-norm will be proven, when an arbitrary monotone flux is used and for each cell the approximating functions are given by polynomials of degree k. The two dimensional fully-discrete explicit method will be combined with the bound preserving limiter. This limiter does not affect the high order accuracy of the numerical method. Then, for the ALE-DG method revised by the limiter the validity of a discrete maximum-principle will be proven. This approach can also be developed for the positivity preserving of ALE-DG methods for Euler equations. The numerical stability, robustness and accuracy of the method will be shown by a variety of computational experiments on moving meshes.