Abstract Submitted
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High-order extended discontinuous Galerkin methods for sharp shock-capturing?[1] MARTIN OBERLACK, MARKUS GEISENHOFER, FLORIAN KUMMER, BJOERN MUELLER, TU Darmstadt, FLUID DYNAMICS TEAM — We study unsteady high Mach number flows using a Discontinuous Galerkin (DG) solver (Mueller 2016) that was extended to immersed boundary methods (IBM) using level sets. Cell-agglomeration was applied for small and ill-shaped cut cells. To cope with shocks, we used an artificial viscosity shock-capturing approach (Persson 2006) that was coupled to IBM (Geisenhofer 2019). There a shock sensor is used to identify critical cells and artificial viscosity smoothens the solution. The severe time stepping restrictions due to an explicit time step together with the additional diffusive term are dealt by an adaptive local time stepping (LTS) approach (Winters 2014) that dynamically (re-)partitions the grid according to their local time step. Presently we extend the shock-fitting techniques using an eXtended DG (XDG) method (Kummer 2016) to regain the desirable DG convergence rates and a sharp jump representation. For this, we first investigate shock tracking in 1D, where we prescribe the flow properties across shocks using the Rankine-Hugoniot conditions in combination with the level set propagation speed. Second, we consider the formation of stationary shocks in 2D, where the artificial viscosity IBM, LTS method will be the initial solution to be morphed to a XDG shock-fitting approach.

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