Title: An effective high-order shock-capturing limiter for discontinuous Galerkin methods

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Abstract:
In this work, we present a novel shock capturing limiter for the discontinuous Galerkin (DG) method. It can be viewed as either an extension of the recent maximum principle preserving (MPP) limiter devised by Zhang and Shu to be able to handle shocks, or as an extension of the older finite volume limiter developed by Barth and Jespersen to the DG framework. Our limiter constructs local upper and lower bounds for the solution by sampling nearest neighbors, and then limits the solution to stay within these bounds. It is simple to implement, has minimal communication, is effective at capturing shocks, and retains genuine high-order accuracy of the solution in smooth regimes. Numerical results including problems that require positivity preservation in one and two dimensions on structured and unstructured grids are presented that indicate the robustness of the method.