Extension of a Post-Processing Technique for the Discontinuous Galerkin Method with an Aeroacoustic Application

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In this poster we extend the applications of a local post-processing technique for the discontinuous Galerkin method. The post-processing technique that we use was originally developed by Bramble and Schatz for elliptic equations using continuous finite element methods. Using negative norm error estimates, Cockburn, Luskin, Shu, and Suli have shown that this highly efficient local post-processor improves the accuracy of the discontinuous Galerkin methods for linear hyperbolic equations from order k+1 to 2k+1, where k is the highest degree polynomial used in the approximation. We investigate this post-processing technique in the context of superconvergence of the derivatives of the numerical solution, two space dimensions, and linearized Euler equations applied to an aeroacoustic problem. We also develop a class of one-sided post-processing techniques to enhance the accuracy for the discontinuous Galerkin methods and apply this technique to a discontinuous coefficient hyperbolic equation. We demonstrate through extensive numerical examples that the technique is very effective in all these situations in enhancing the accuracy of the discontinuous Galerkin solutions.

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