

Smoothness-Increasing Accuracy-Conserving: Challenging the Assumption of Uniformity

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Previous investigations into accuracy enhancement for a discontinuous Galerkin solution demonstrated that there are many ways to approach obtaining higher-order accuracy in the solution, for example, the Smoothness-Increasing Accuracy-Conserving (SIAC) filtering. For the discontinuous Galerkin method, the order of accuracy without post-processing is $k+1$. For the post-processed solution, it is $2k+1$. Additionally, the SIAC filtering introduces higher levels of smoothness into the new approximation. However, previous investigations were mainly limited to uniform meshes (or nearly uniform meshes) consideration, which is highly restrictive for practical application. In this talk, we discuss the challenges and difficulties for nonuniform meshes. Additionally, we present several common techniques of for nonuniform meshes will be introduced. Moreover, we propose a new technique which considers the mesh structure as a parameter when dealing the nonuniform meshes. A comparison is made among these techniques through numerical examples.