

Oscillation-Free Discontinuous Galerkin Method for Conservation Laws

Chi-Wang Shu

Division of Applied Mathematics, Brown University, Providence, RI 02912, USA
CHI-WANG_SHU@BROWN.EDU

Abstract

We discuss a recently developed class of oscillation-free discontinuous Galerkin (OFDG) method for solving hyperbolic conservation laws. Discontinuous Galerkin methods are well-known for their nice properties for solving hyperbolic conservation laws, such as entropy stability, high order convergence, parallel efficiency and easiness for h-p adaptivity. However, for strong shocks, unmodulated discontinuous Galerkin methods still suffer from spurious oscillations. Traditional strategies to control such oscillations include artificial viscosity and various limiters. Recently, a class of oscillation-free discontinuous Galerkin method has been developed, which contains a carefully designed local damping term and ensures essentially oscillation-free performance. The OFDG method maintains the nice theoretical properties of discontinuous Galerkin methods such as entropy stability, optimal order of convergence, and superconvergence. The method has been developed for scalar equations and systems, including Euler equations and MHD equations. Numerical results demonstrate the nice performance of the method. This is a joint work with Yong Liu and Jianfang Lu.

References

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