

High fidelity simulations of hyperbolic systems with high accurate numerical methods --- At least a try...

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Abstract.

In this presentation, we will review how finite volume (FV) and discontinuous Galerkin (DG) numerical schemes are employed to compute approximate solutions of hyperbolic systems of partial differential equations (PDEs). Robustness, stability, and accuracy are central mathematical properties of such methods, yet they become challenging to guarantee when discontinuous solutions arise. In these situations, the elegant underlying theory often breaks down, and the notions of accuracy, stability, and robustness must be interpreted in a more pragmatic sense—essentially to prevent the numerical code from producing physically meaningless results.

To address these difficulties, the concept of limiting plays a crucial role. In this talk, we will introduce limiting strategies in both FV and DG methods, highlighting their advantages and drawbacks, and illustrating the discussion with examples of both successful and problematic numerical solutions.