Robustness and entropy inequalities through artificial viscosity

Authors:

- Christophe Berthon, Université Nantes (christophe.berthon@univ-nantes.fr)
- Manuel J Castro, Universidad de Málaga (mjcastro@uma.es)
- Arnaud Duran, Université Claude Bernard Lyon 1 (arnaud.duran@univ-lyon1.fr)
- Tomás Morales de Luna, Universidad de Málaga (tmorales@uma.es)
- Khaled Saleh, Université Claude Bernard Lyon 1 (saleh@math.univ-lyon1.fr)

Abstract:

In the present work, we consider the numerical approximation of the weak solutions of first order system of hyperbolic PDEs supplemented with entropy inequalities. Here we propose a general procedure to ensure the robustness and the entropy stability of any first order finite volume numerical scheme by introducing a suitable artificial numerical viscosity.

In order to obtain the required properties, first a reformulation of any given first order finite volume solver is performed in terms of a judicious approximate Riemann solver. Next, we show that choosing a proper numerical viscosity, and setting a suitable CFL condition, both robustness and the discrete entropy inequalities are recovered. Finally, we show numerical approximations of the solutions of the isentropic gas dynamic model and the one and two-layer shallow water systems. We show the ability of the here designed technique to stabilize entropy violating schemes.

The main results of this talk have been published on [**?**]

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References:

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