Entropy-Preserving Numerical Schemes.

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Given a system of conservation laws

$$u_t + f(u)_x = 0, \tag{1}$$

equipped with an entropy pair, (η, q), is it known that the entropy weak solutions satisfy the inequality

$$\eta(u)_t + q(u)_x \leq 0, \tag{2}$$

A numerical method si said to be entropy stable if a discretized version of (2) can be shown. Tadmor in [4] introduced the so-called entropy-preserving numerical fluxes that, together with an adequate numerical viscous term, allow one to obtain entropy stable methods. Tadmor's framework has been extended to non-conservative systems in [1]-[2], and to degenerate convection-difussion equations in [3]. In this talk, these extensions, as well as their practical interest, will be discussed.

References

[1] Castro M.J., Fjordlhom U.S., Mishra S., Parés C. *Entropy conservative and entropy stable schemes for nonconservative hyperbolic systems.* SIAM J. Num. Anal. 51 (2013), 1371–1391.

[2] Hilebrand A., Mishra S., Parés C. *Entropy-stable space-time DG schemes for non-conservative hyperbolic systems.* To appear in ESAIM-M2AN.

[3] Jerez S., Parés C. *Entropy stable schemes for degenerate convection-diffusion equations.* SIAM J. on Num. Anal. 55 (2017), 240–264.

[4] Tadmor E., *The numerical viscosity of entropy stable schemes for systems of conservation laws. I.* Math. Comp. 103 (1987), 49–91.