

Numerical approximation of measure-valued solutions to hyperbolic conservation laws

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One-dimensional hyperbolic systems of conservation laws are well-posed under the assumption that the initial data is “sufficiently small”. However, there is a great lack of stability, existence or uniqueness theory for general initial data in multiple dimensions, and certain Cauchy problems might indeed be unstable with respect to initial data. We advocate the point of view of so-called measure-valued solutions, and give numerical evidence that this might be the correct notion of solutions for hyperbolic conservation laws. We prove the existence and stability of measure-valued solutions in certain special cases, and design numerical algorithms that show strongly convergent behavior in unstable Cauchy problems.

This is joint work with R. Kaeppli, S. Mishra and E. Tadmor.