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Convergence of a new Scheme for Non-Classical Waves

Conservation laws are used in a wide range of applications. Some of these applications show special phenomena which can be understood with the help of non-classical waves.

One important application is multiphase flow. Let us for example look at a liquid droplet in vapour. The surface of the droplet becomes a non-classical shock in the mathematical model. It is well known that the criterion of entropy solutions is not enough to get well-posedness in this setting. For uniqueness an additional algebraic equation is required which each non-classical wave has to satisfy. Following Abeyaratne & Knowles this equation is called kinetic relation. Due to the need of a kinetic relation normal finite volume schemes are not able to treat non-classical shocks.

In the talk we will introduce a new generalised finite volume scheme which is able to treat non-classical shocks. The scheme will be written down in a more-dimensional setting for systems of conservation laws. After introducing the scheme, we will proof for the scalar one-dimensional case with only one phase boundary that the scheme converges.

This is joint work with C. Chalons and C. Rohde.