

**Bürger, Raimund; Karlsen, Kenneth H.; Towers, John D.**

**On some difference schemes and entropy conditions for a class of multi-species kinematic flow models with discontinuous flux.** (English) [Zbl 1263.76048](#)  
*Netw. Heterog. Media* 5, No. 3, 461-485 (2010).

**Summary:** We study a system of conservation laws that describes multi-species kinematic flows with an emphasis on models of multiclass traffic flow and of the creaming of oil-in-water dispersions. The flux can have a spatial discontinuity which models abrupt changes of road surface conditions or of the cross-sectional area in a settling vessel. For this system, an entropy inequality is proposed that singles out a relevant solution at the interface. It is shown that “piecewise smooth” limit solutions generated by the semi-discrete version of a numerical scheme the authors recently proposed [*R. Bürger, A. García, K. H. Karlsen and J. D. Towers, J. Eng. Math.* 60, No. 3–4, 387–425 (2008; [Zbl 1200.76126](#))] satisfy this entropy inequality. We present an improvement to this scheme by means of a special interface flux that is activated only at a few grid points where the discontinuity is located. While an entropy inequality is established for the semi-discrete versions of the scheme only, numerical experiments support that the fully discrete scheme are equally entropy-admissible.

**MSC:**

- 76M25 Other numerical methods (fluid mechanics) (MSC2010)
- 65M06 Finite difference methods for initial value and initial-boundary value problems involving PDEs
- 76T99 Multiphase and multicomponent flows
- 90B20 Traffic problems in operations research

Cited in 4 Documents

**Keywords:**

difference schemes; entropy condition; systems of conservation laws; discontinuous flux; multi-species kinematic flow model

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