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Existence of solutions to singular conservation laws. (English) Zbl 0567.35060
SIAM J. Math. Anal. 15, 1125-1139 (1984).

The scalar conservation law $u_t + f(u)_x + g(u)/x = 0$ is considered with f, g smooth, f strictly convex or strictly concave and with definite sign of $ug(u)$ at infinity (either $ug(u) \geq 0$ or $ug(u) < 0$ for large u). Existence of the solution to the initial-value problem for such a conservation law ($u(0, x) = u_0(x)$, $x > 0$) is proved by regularizing the equation to the form $u_t + f(u)_x + g(u)/(x + \delta) = \epsilon u_{xx}$ and taking a singular limit. Local L^∞ a priori bounds are obtained either by maximum principle for parabolic equations or by estimating the solution along generalized backward characteristics. Then the method of compensated compactness is applied, which allows to pass to the limit without gradient estimates.

Reviewer: [A.Doktor](#)

MSC:

- [35L65](#) Hyperbolic conservation laws
- [35L45](#) Initial value problems for first-order hyperbolic systems
- [35A05](#) General existence and uniqueness theorems (PDE) (MSC2000)

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Keywords:

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