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An existence and uniqueness result for two nonstrictly hyperbolic systems. (English)

Zbl 0727.35083

Nonlinear evolution equations that change type, Proc. Workshop IMA Nonlinear Waves, Minneapolis/MN (USA) 1988-89, IMA Vol. Math. Appl. 27, 126-138 (1990).

Summary: [For the entire collection see [Zbl 0712.00019](#).]

We prove a result of existence and uniqueness of entropy weak solutions for two nonstrictly hyperbolic systems, both a nonconservative system of two equations

$$\partial_t u + \partial_x f(u) = 0, \quad \partial_t w + a(u)\partial_x w = 0,$$

and a conservative system of two equations

$$\partial_t u + \partial_x f(u) = 0, \quad \partial_t v + \partial_x(a(u)v) = 0,$$

where $f: \mathbb{R} \rightarrow \mathbb{R}$ is a given strictly convex function and $a = (d/du)f$. We use the Volpert's product and find entropy weak solutions u and w which have bounded variation while the solutions v are Borel measures. The equations for w and v can be viewed as linear hyperbolic equations with discontinuous coefficients.

MSC:

[35L60](#) First-order nonlinear hyperbolic equations

[35D05](#) Existence of generalized solutions of PDE (MSC2000)

Cited in **4** Reviews
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Keywords:

[existence](#); [uniqueness](#); [entropy weak solutions](#); [Borel measures](#)