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SOLUTIONS WITH SHOCKS IN SEVERAL VARIABLES

Marek Burnat

Dedicated to Louis Nirenberg on the occasion of his 70th birthday

0. Introduction

We consider autonomous systems of the form

$$\sum_{j=1}^{l}\sum_{i=1}^{n} a_{ijs}(u)\partial_{x_i}u_j = 0, \qquad s = 1,\dots,r \geq l. \tag{1}$$

It is known ([1], [8]) that if $r = l$ and (1) is hyperbolic, then the solutions $u : \mathbb{R}^n \supset D \to \mathbb{R}^l$, $u \in C^1(D)$, are characterized by the following condition for their Jacobi matrix:

$$Du(x) = \sum_{i=1}^{q} \alpha_i(x)\lambda^i(u(x)) \otimes \gamma^i(u(x)), \qquad q < \infty,\ x \in D, \tag{2}$$

where

$$\sum_{j=1}^{l}\sum_{i=1}^{n} a_{ijs}(u)\lambda_i\gamma_j = 0, \qquad s = 1,\dots,r,$$

for $\lambda^i(u) = (\lambda_1,\dots,\lambda_n)$, $\gamma^i(u) = (\gamma_1,\dots,\gamma_n)$, and $\alpha_i : D \to \mathbb{R}$ are appropriate functions.

In the present paper we deal with systems (1), $r \geq l$, which are hyperbolic in the sense that the solutions are described by the property (2). An example

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