

Nonlinear Stability of Shock Fronts for a Relaxation System in Several Space Dimensions

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We study the nonlinear asymptotic stability of planar shock front for a class of relaxation systems which approximate scalar conservation laws in several space dimensions time asymptotically. It is shown that if the relaxation system satisfies the subcharacteristic condition, then a traveling wave solution connecting a weak entropy shock is asymptotically stable under small generic perturbations. © 1997 Academic Press.

1. INTRODUCTION AND MAIN THEOREM

It is proposed by Jin and Xin in [JX] to use the relaxation system

$$u_t + \sum_{i=1}^m (v_i)_{x_i} = 0, \quad u \in R^n, \quad v_i \in R^n, \quad (1.1)$$

$$v_{it} + A_i u_{x_i} = -\frac{(v_i - F_i(u))}{\varepsilon}, \quad i = 1, 2, \dots, m \quad (1.2)$$

to approximate scalar multi-dimensional hyperbolic conservation laws of the form

$$u_t + \sum_{i=1}^m F_i(u)_{x_i} = 0, \quad (x_i, t) \in R^1 \times R^+, \quad u \in R^n. \quad (1.3)$$

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Stability Of Multi Dimensional Shock Fronts

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