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Mixed problems for evolution equations II

by

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We discussed non-characteristic boundary value problems for single evolution equations in Part I([1]). In this paper, we consider characterfstic boundary value problems for single evolution equations. Under the assumption of mildness of characteristic, we can consider the problems in the similar framework to that in Part I. We shall be satisfied only to show the way to get the basic energy inequality, but it is easy to get the existence and uniqueness theorem in H^∞-sense by the similar way as in Part I.

§ 1. Assumptions.

Let $A(t, x, y; \tau, \xi, \eta)$ and $\{B_j(t, y; \tau, \xi, \eta)\}_{j=1,\dots,m_+}$, where we denote

$$B(t, y; \tau, \xi, \eta) = \begin{bmatrix} B_1(t, y; \tau, \xi, \eta) \\ \vdots \\ B_{m_+}(t, y; \tau, \xi, \eta) \end{bmatrix},$$

be polynomials with respect to (τ, ξ, η) with $\mathscr{B}^\infty$-coefficients in R^{n+1}, which are constant outside a ball in R^{n+1}. Let N be the Newton polygon of A in the sense of Part I, where we consider the following two cases in unified manner.

Case 1. The vertices of N are composed of the origin and

$$P_i = (\mu_{i+1} + \cdots + \mu_l, \ m_1 + \cdots + m_i) \qquad (i=0, \dots, l),$$

where

$$m_i/\mu_i = p_i \ \text{ and } \ p_1 > p_2 > \dots > p_l = 1 \qquad (\sum_{i=1}^{l} m_i = m, \ \sum_{i=1}^{l} \mu_i = \mu).$$

Case 2. The vertices of N are composed of the origin, $P_1, P_2, \dots, P_{l-1}$, and

$$P_l' = (1, m-1), \ P_l'' = (0, m-1).$$