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UNIQUENESS OF THE CAUCHY PROBLEM FOR PARTIAL DIFFERENTIAL OPERATORS WITH CHARACTERISTICS OF CONSTANT MULTIPLICITY

RAK JOONG KIM

In the C^∞ framework Calderon was the first to prove general uniqueness theorems for operators of high order in more than two variables. He made use of the singular integral operators, now commonly called pseudodifferential operators. To establish the uniqueness for partial differential operators of order m with characteristics of constant multiplicity, the conditions of various types were obtained by Matsumoto, Zeman, Damlakhi, Zuily, Roberts and Wenston. In the present paper we deal with the operator

$$P = D_t^m + a_{m-1}(x,t)D_t^{m-1} + \cdots + a_{m-j+1}(x,t)D_t^{m-j+1} + \sum_{|\alpha|+\beta\leq m-j} t^{(m-\beta)} a_{\alpha,\beta}(x,t) D_x^\alpha D_t^\beta$$

where $1 < j \leqq m$ and assume

(H. 1) each zero $\tau = \lambda^{(q)}(x,t;\xi)$, $q=1,\dots,m$. of the polynomial $\sigma(p_0) = \tau^m + \sum_{|\alpha|+\beta=m-j} a_{\alpha,\beta}(x,t)\xi^\alpha\tau^\beta$

is never real in a neighborhood of the origin in $R^{n+1}_{x,t}$,

(H. 2) $a_{\alpha,\beta}(x,t) \in C^\infty$ if $|\alpha|+\beta = m-j$
$a_{\alpha,\beta}(x,t) \in L^\infty$ if $|\alpha|+\beta \neq m-j$.

The purpose of this paper is to fill the gap between Damlakhi and Zuily's operators and Roberts ans Wenston's operators. Representing P_0 as a linear combination of pseudodifferential operators, we establish Carleman type estimates. By means of a partition of unity we prove the basic proposition.

Hallym University
Chunchon 200, Korea

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