125. Structure of Cohomology Groups Whose Coefficients are Microfunction Solution Sheaves of Systems of Pseudo-Differential Equations with Multiple Characteristics. II

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This is a continuation of our preceding note Kashiwara-Kawai-Oshima [1], hereafter referred to as K-K-O [1]. The purpose of this note is to investigate the structure of cohomology groups whose coefficients are microfunction solution sheaf of a system $\mathcal{M}$ of pseudo-differential equations which satisfies conditions (2)$\sim$(8) in K-K-O [1], but does not necessarily satisfy condition (9) in general. The details of this note will appear elsewhere.

In this note we use the same notations as in K-K-O [1]. For example, W denotes the real locus of $V_1\cap V_1^c=V_2\cap V_2^c$. Since W acquires canonically the structure of a purely imaginary contact manifold by condition (6) in K-K-O [1], sheaf $\mathcal{C}_W$ of microfunctions and sheaf $\mathcal{P}_W$ of pseudo-differential operators can be defined on W.

When $\kappa=\left.\dfrac{\sigma(Q)}{\{\sigma(P_2),\sigma(P_1)\}}\right|_{V_1\cap V_2}$ takes an integral value, the structure of κ plays an important role in calculating the cohomology groups. So we give the following preparatory consideration concerning lower order terms.

Let R be a pseudo-differential operator on W whose principal symbol is κ. Such a pseudo-differential operator R is uniquely determined up to inner automorphism of $\mathcal{P}_W$ by condition (5) in K-K-O [1]. (See Theorem 2.1.2 in Chap. II of Sato-Kawai-Kashiwara [2].) Taking account of this fact, we denote by $\mathcal{L}_l$ the pseudo-differential equation $(R-l)u=0$ on W for $l\in \boldsymbol{Z}$.

In order to calculate the cohomology groups when κ takes an integral value, we should study in the following four cases classified according to the signatures of the generalized Levi forms of V_1, V_2 and $T^*_{V_1}X^C\cap T^*_{V_2}X^C$. We denote by L_j the generalized Levi form of V_j ($j=1,2$, respectively) and by L the hermitian form $\{\xi,\bar{\eta}\}$ on $(T^*_{V_1}X^C)_{x^*}\cap(T^*_{V_2}X^C)_{x^*}$.

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