9. *On the Microlocal Structure of the Regular Prehomogeneous Vector Space Associated with SL(5)×GL(4). I*

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In this article, we study the microlocal structure of the triplet $(SL(5)\times GL(4), \Lambda_2\otimes\Lambda_1, V(10)\otimes V(4))$. In the present article, we give its orbital decomposition, the main part of its holonomy diagram, and some of its local b-functions. Incidentally, this prehomogeneous vector space is the most intricate of all of the reduced irreducible prehomogeneous vector spaces. (See [1].)

Notations. $G=SL(5)\times GL(4)$, $\rho=\Lambda_2\otimes\Lambda_1$, $V=V(10)\otimes V(4)$, $V^*=$the dual space of V, $G_x=$the isotropy subgroup of G at x, $\mathfrak{g}=$the Lie algebra of G, $\mathfrak{g}_x=$the Lie algebra of G_x, i.e. the isotropy subalgebra at x, $V^*_x=$the conormal vector space $(d\rho(\mathfrak{g})x)^{\perp}$ at x, $b(s)=$the b-function of (G, ρ, V), $b_{ij}(s)=$the local b-function of the holonomic variety Λ_{ij} which is the conormal bundle of the G-orbit S_{ij} defined as follows. When the conormal bundle $\Lambda(\subset V\times V^*)$ of a G-orbit S in V coincides with the conormal bundle $\Lambda^*(\subset V\times V^*)$ of a G-orbit S^* in V^*, we say that they are each other's dual orbits. We denote by S_{ij} the i-codimensional G-orbit in V whose dual orbit is j-codimensional.

§1. The orbital decomposition. Proposition 1.1. *The triplet* $(SL(5)\times GL(4), \Lambda_2\otimes\Lambda_1, V(10)\otimes V(4))$ *has* 62 *orbits given in Table* I.

Remark 1.2. The fact that these 62 orbits are mutually distinct follows immediately by comparing their isotropy subalgebras at representative points (see Table II and Remark 1.5). In order to show that no other orbit exists, we need to classify the zeros of the localization of the relative invariant on each of several holonomic varieties. Note that this space has a relatively invariant irreducible polynomial $f(x)$ of degree 40, which is unique up to a constant multiple (see [1]). The 62 orbits are shown in Table I. Each of the 33 rows lists a pair of mutually dual orbits. Note that each of the four orbits $S_{7,7}$, $S_{8,8}$, $S_{9,9}$, and $S_{10,10}$ is dual to itself.

Remark 1.3. As a matter of notation, the following method of abbreviation is used: for example, $236-137+128+459$ stands for $(u_2\wedge u_3)\otimes u_6-(u_1\wedge u_3)\otimes u_7+(u_1\wedge u_2)\otimes u_8+(u_4\wedge u_5)\otimes u_9$ $(\in V(10)\otimes V(4))$, where the $u_i\wedge u_j$ $(1\leqslant i<j\leqslant 5)$ and u_k $(6\leqslant k\leqslant 9)$ span $V(10)$ and $V(4)$ respectively.