# 5. On the Microlocal Structure of a Regular Prehomogeneous Vector Space Associated with $GL(8)$

By Ikuzō OZEKI

The School for the Blind Attached to Tsukuba University, Tokyo

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Let $V(n)$ be the $n$-dimensional vector space over $C$ spanned by $u_1, \cdots, u_n$. Then the general linear group $GL(n)$ acts on $V(n)$ by $\rho_1(g)(u_1, \cdots, u_n)=(u_1, \cdots, u_n)g$ for $g \in GL(n)$.

Let $V$ be the vector space spanned by skew-tensors $u_i \wedge u_j \wedge u_k$ $(1 \leq i<j<k \leq n)$ of degree three. Then the action $\rho=\Lambda_3$ of $GL(n)$ on $V$ is given by $\rho(g)(u_i \wedge u_j \wedge u_k)=\rho_1(g)u_i \wedge \rho_1(g)u_j \wedge \rho_1(g)u_k$. The triplet $(GL(n), \Lambda_3, V)$ is a regular prehomogeneous vector space if and only if $n=3, 6$, 7 or 8 (see [1]). For the case $n=3$, 6 or 7, its microlocal structure has been investigated in [2]. In this article, we study the remaining case, i.e., $n=8$. We use the same notations as in [3].

A brief sketch of the present article and [3] had been given in [6].

§ 1. **The orbits.** The orbital decomposition of this space $(GL(8), \Lambda_3, V)$ was completed by Gurevich (see [4]). A representative point of each orbit is given in Table I.

Table I. Representative points of the orbits and their isotropy subgroups

| Numbers | Representative points | Isotropy subgroups |
|---|---|---|
| 0, 56 | $123+147+148+257+368+456$ | $SL(3)$ |
| 1, 40 | $4\langle 148\rangle-8\langle 157\rangle-2\langle 238\rangle+247$ $+4\langle 256\rangle-2\langle 346\rangle$ | $(SL(2)\times GL(1))\cdot(G_a)^5$ |
| 3, 31 | $138+167+247-256+345$ | $(SL(2)\times GL(1)^2)\cdot U(6)$ |
| 4, 25 | $136+147+236-258-345$ | $GL(1)^3\cdot U(9)$ |
| 6, 21 | $127-156+236-245-348$ | $(SL(2)\times GL(1)^2)\cdot U(9)$ |
| 8, 24 | $134+156+234+278$ | $(SL(2)^3\times GL(1))\cdot(G_a)^6$ |
| 8, 16 | $128+147-156-237+246+345$ | $(SL(2)\times GL(1))\cdot U(12)$ |
| 9, 18 | $136-145+234+278$ | $(SL(2)^2\times GL(1)^2)\cdot U(9)$ |
| 10, 13 | $128-137+156-246+345$ | $(SL(2)\times GL(1)^2)\cdot U(13)$ |
| 12, 12 | $136+147-235+248$ | $(SL(2)^2\times GL(1)^2\cdot(G_a)^{12}$ |
| 13, 10 | $128-137+146+236-245$ | $(SL(2)\times GL(1))\cdot U(17)$ |
| 14, 28 | $125+136+147+234+567$ | $(G_2\times GL(1))\cdot(G_a)^7$ |
| 15, 15′ | $157+168+234$ | $(SL(3)\times Sp(2)\times GL(1))\cdot(G_a)^4$ |
| 15′, 15 | $127+136+246+345$ | $(SL(2)^2\times GL(1)^2)\cdot U(15)$ |
| 16, 8 | $128-137+156+234$ | $(SL(2)^2\times GL(1)^2)\cdot U(16)$ |
| 18, 9 | $127+134-256$ | $(SL(2)^2\times GL(1)^3)\cdot U(17)$ |