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THE OSCILLATOR CORRESPONDENCE OF ORBITAL INTEGRALS, FOR PAIRS OF TYPE ONE IN THE STABLE RANGE

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1. Introduction. Let G, $G' \subseteq Sp(W)$ be a reductive dual pair of type I; see [H2]. Thus, there is a division algebra $\mathbf{D} = (\mathbf{R}, \mathbf{C}, \mathbf{H})$ with an involution over $\mathbf{R}$, two finite-dimensional vector spaces over $\mathbf{D}$, V and V' equipped with nondegenerate forms $(\ ,\ )$ and $(\ ,\ )'$, respectively—one hermitian and the other skew-hermitian. The groups G, G' are the isometry groups of the forms $(\ ,\ )$, $(\ ,\ )'$, respectively. Let W denote the vector space $W = \mathrm{Hom}(V', V)$. A symplectic form on W is defined by

$$\langle w, w' \rangle = \mathrm{tr}_{\mathbf{D}/\mathbf{R}}(ww'^*) \qquad (w, w' \in W), \tag{1.1}$$

where the map $\mathrm{Hom}(V', V) \ni w \to w^* \in \mathrm{Hom}(V, V')$ is defined by

$$(w(v'), v) = (v', w^*(v))' \qquad (w \in W, v \in V, v' \in V'). \tag{1.2}$$

The groups G and G' act on W via postmultiplication and premultiplication by the inverse, respectively. These actions embed G and G' into the symplectic group $Sp(W)$.

Let $\widetilde{Sp}$ denote the metaplectic group, and let $\tilde{G}$, $\tilde{G}'$ be the preimages of G, G' under the covering map $\widetilde{Sp} \to Sp$. The duality theorem of Howe [H3] states that there is a bijection $\Pi \leftrightarrow \Pi'$ between certain irreducible admissible representations of $\tilde{G}$ and $\tilde{G}'$.

Recall the unnormalized moment maps

$$\tau_{\mathfrak{g}}: W \ni w \to ww^* \in \mathfrak{g}, \qquad \tau_{\mathfrak{g}'}: W \ni w \to w^*w \in \mathfrak{g}'. \tag{1.3}$$

In the early 1980s, Howe conjectured that the wave-front sets of Π and Π' are related to the geometry of moment maps in some nice way.

CONJECTURE (Howe). *For a generic pair* (Π, Π') *occurring in Howe's correspondence,*

$$WF(\Pi') = \tau_{\mathfrak{g}'}(\tau_{\mathfrak{g}}^{-1}(WF(\Pi))). \tag{1.4}$$

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