51. *On Invariant Eigendistributions on $U(p, q)/(U(r)\times U(p-r, q))$*

By Shigeru AOKI*) and Suehiro KATO**)

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1. Introduction. Let $X=G/H$ be a semisimple symmetric space, and $\mathcal{O}$ an H-invariant open subset of X. Let $\boldsymbol{D}(X)$ be the ring of invariant differential operators on X, and χ a character of $\boldsymbol{D}(X)$. A Schwartz distribution Θ on $\mathcal{O}$ is said to be an *invariant eigendistribution* (=*IED*) with an *infinitesimal character* χ, if (i) Θ is H-invariant, and (ii) $D\Theta=\chi(D)\Theta$ for all $D\in\boldsymbol{D}(X)$. We denote by $\mathcal{D}'_{\chi,H}(\mathcal{O})$ the set of all IED's on $\mathcal{O}$ with the infinitesimal character χ. Let X' be the subset of all regular semisimple elements in X. X' is H-invariant, open and dense. As is well-known, any $\Theta\in\mathcal{D}'_{\chi,H}(X')$ is a real analytic function. For any $\Theta\in\mathcal{D}'_{\chi,H}(X)$ we have clearly $\Theta|_{X'}\in\mathcal{D}'_{\chi,H}(X')$.

In the following, we take $X=U(p,q)/(U(r)\times U(p-r,q))$. Our aim is to determine IED's on X as explicitly as possible. For this end, we study the following problem, to which a corresponding problem for semisimple Lie groups was investigated in detail by Hirai [4]:

Problem. *Find a necessary and sufficient condition for an IED on X' to be extensible to an IED on X.*

In this article, we give a necessary condition in the case where the infinitesimal character is regular (cf. the last part of 2). It will be shown that our condition is also sufficient, when the infinitesimal character χ is "generic". We conjecture that this will hold even in the case where χ is not generic.

We briefly describe our method. We need first to know the following:

(i) The radial parts of invariant differential operators;

(ii) Invariant integrals, especially, their behavior around a singular semisimple element x in X.

The results on (i) were essentially given by Hoogenboom [5]. To investigate (ii), we consider the symmetric subspace $Z_G(x)/Z_H(x)$ of X defined by the centralizers of x in G and H respectively, and the invariant integrals on this subspace. From (i) and (ii), we can control, via Weyl's integral formula, the behavior of IED's around x, and hence we get our main results.

Results in the case of singular (i.e. non-regular) infinitesimal character will appear in our forthcoming paper.

*) Department of Mathematics, Faculty of Engineering, Takushoku University.
**) Department of Mathematics, College of General Education, Kitasato University.