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PART-II CHARACTERS OF NAGENDRAM Γ-SEMI SUB NEAR-FIELD SPACE OF A Γ-NEAR-FIELD SPACE OVER NEAR-FIELD

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ABSTRACT

In this manuscript we prove that every element of a compact, connected Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field lies in some maximal torus of Nagendram Γ-semi sub near-field space. Suppose we know that exp : $g \to N$ is onto. Then, if $g \in N$, we see that $g = \exp X$ for some $X \in g$. Now, NX is an abelian sub algebra of g and therefore lies in a maximal abelian sub-algebra h. Then, exp h is a maximal torus in N containing g. To prove that exp is onto, we will appeal to familiar tools from Riemannian geometry.

Keywords: *Invariant, Ad-invariant, Riemannian geometry, characters of complex irreducible representations of compact Nagendram Γ-semi sub near-field space, Γ-near-field space; Γ-Semi sub near-field space of Γ-near-field space; Semi near-field space of Γ-near-field space, Nagendram Γ-semi sub near-field space, Nagendram Γ-semi near-field space, closed, compact, connected Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field, orthogonality characters of Nagendram Γ-semi sub near-field space.*

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SECTION-1: INTRODUCTION AND PRELIMINARIES.

In this paper author introduced PART II characters of complex irreducible representations of compact Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field.

Lemma 1.1: Let N be a compact Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field**.** Then N has a bi-invariant Riemannian metric.

Proof: On Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field N, bi-invariant metrics correspond to Ad-invariant inner products on *g:* If g is a bi-invariant metric, g_1 on T_1N is Ad-invariant. If g_1 is an Ad-invariant metric inner product on T_1N, then its left translation is a bi-invariant metric. If N is compact, then T_1N has an Ad-invariant inner product: take an arbitrary positive definite inner product and average it over N. This completes the proof of the Lemma.

Definition 1.2: A connection ∇ on a manifold M is an R-bilinear map $\nabla : \Gamma(\Gamma M) \times \Gamma(\Gamma M)$ and $(X, Y) \mapsto \nabla_X Y$ such that

a. $\nabla_{fX} Y = f \nabla_X Y$ and
b. $\nabla_X (fY) = (Xf) Y + f \nabla_X Y$ for any $f \in C^\infty(M)$ and $X, Y \in \Gamma(\Gamma M)$.

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Theorem 1.3: Let (M, *g*) be a Riemannian manifold. Then there is a unique connection $\nabla = \nabla^g$ on M such that
(a). $X\,({}_g(Y, Z)) = {}_g(\nabla_X Y, Z) + {}_g(Y, \nabla_X Z)$ and
(b). $\nabla_X Y - \nabla_Y X = [X, Y]$.
Moreover, $2g(X, \nabla_Z Y) = Z(g(X, Y)) + Y(g(X, Z)) - X(g(Y, Z))$
$+ g(Z, |X, Y|) + g(Y, |X, Z|) - g(X, |Y, Z|)$.

Theorem 1.4: Let M be a manifold with a connection ∇ and $\gamma : (a, b) \to M$ a curve. Then there exists a unique N – linear map $\dfrac{\nabla}{dt} : \Gamma(\gamma^* TM) \to \Gamma(\gamma^* TM)$

Such that 1. $\dfrac{\nabla}{dt}(f V) = \dfrac{df}{dt}V + f\dfrac{\nabla}{dt}V$ for all $f \in C^\infty(a, b)$ and $V \in \Gamma(TM)$.

2. if $X \in \Gamma(TM)$ then $\dfrac{\nabla}{dt}(X \circ Y) = \nabla_Y X$.

Definition 1.5: A curve $\gamma : (a, b) \to M$ is a geodesic for a connection ∇ if $\dfrac{\nabla}{dt}\gamma = 0$. Recall that if $x \in M$, $v \in T_x M$, then there is a unique geodesic γ such that $\gamma(0) = x$ and $\overline{\gamma}(0) = v$.

SECTION-2: BI-INVARIANT CHARACTERS OF NAGENDRAM GAMMA SEMI SUB NEAR-FIELD SPACES OF A GAMMA NEAR-FIELD SPACE OVER A NEAR-FIELD.

In this section, author present theorem on bi-invariant metric on characters of Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field.

Theorem 2.1: Let N be Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field, *g* be a bi-invariant metric on G and ∇ the corresponding connection. Then, for any left invariant vector fields Z and Y $\nabla_Z Y = \dfrac{1}{2}[Y, Y]$

Proof:
Let X, Y, Z be left invariant Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field. Then,$(g(X, Y))(a) = (g(X,Y))(I)$ for any $a \in N$.

Consequently, the map $a \mapsto (g(X, Y))(a)$ is a constant function. Also since *g* is bi-invariant Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field N, we see that $g([X, Y], Z) + g(X,[Y, Z]) = 0$. These, two facts together, along with the formula for the connection in the above theorem show that $2g(X, \nabla_Z Y) = g(X, [Z, Y])$. Since, X is an arbitrary and the metric is non-degenerate, $2\nabla_Z Y = [Z, Y]$. This completes the proof of the theorem.

Lemma 2.2: For any $X \in g$, $a \in N$, $\gamma(t) = a \exp tX$ is a geodesic. Moreover, all the geodesics are of this form.

Proof : If $\gamma(t) = a \exp tX$, then $\gamma(t) = (dL_{a \exp tX})\, X(1) = X(\gamma(t))$
And so $\dfrac{\nabla}{dt}\gamma = \nabla_X X = \dfrac{1}{2}[X, X] = 0$.
Thus, $\gamma(t)$ is a geodesic. Moreover, for all $a \in N$ and for all $v \in T_a N$ there is $X \in g$ such that $X(a) = v$. Therefore, $\gamma(t) = a \exp tX$ is a geodesic with $\gamma(0) = a$, $\overline{\gamma}(0) = X(a) = v$. This completes the proof of the theorem.

Theorem 2.2: If (M, *g*) is a complete bi-invariant Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field N, connected Riemannian manifold, then any two points can be joined by a geodesic.

Theorem 2.3: Let N be a compact, connected bi-invariant Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field. Then, $\exp : g \to N$ is onto.

Proof: Any point $g \in N$ can be connected to $1 \in N$ by a geodesic which is of the form $t \mapsto \exp tX$ for some $X \in g$. Any element of a compact, connected bi-invariant Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field lies in a maximal torus. This completes the proof of the theorem.

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