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 → N is onto. Then, if g ∈ N, we see that g = exp X for some X ∈ g. Now, NX is an abelian subalgebra 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.


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 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, on T[N is Ad-invariant. If g, is an Ad-invariant metric inner product on T[N, then its left translation is a bi-invariant metric. If N is compact, then T[N 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 ∇ : Γ(ΓM) × Γ(ΓM) and (X, Y) → ∇X Y such that
a. ∇ f X Y = f ∇X Y and
b. ∇X (fY) = (∇ X f) Y + f ∇X Y for any f ∈ C∞ (M) and X, Y ∈ Γ(ΓM).

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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, 
\[ 2g(X, \nabla_{\nabla_Y Z}) = g([X, Y], Z) + g(Y, [X, Z]) - g([X, Z], Y) - g(X, [Y, Z]). \]

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

\(1. \frac{d}{dt} (f \gamma) = \frac{df}{dt} \gamma + \int f \frac{\nabla}{dt} V \) for all \(f \in C^\infty(a, b)\) and \(V \in \Gamma(TM). \)

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

Definition 1.5: A curve \(\gamma: (a, b) \rightarrow M\) is a geodesic for a connection \(\nabla\) if \(\frac{d}{dt} \gamma = 0.\) Recall that if \(x \in M, v \in T_x M,\) then there is a unique geodesic \(\gamma\) such that \(\gamma(0) = x\) and \(\gamma'(0) = v.\)

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 \(\nabla\) the corresponding connection. Then, for any left invariant vector fields \(Z\) and \(Y\)

\[ \nabla Z Y = \frac{1}{2} [Z, Y]. \]

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 \(2g(X, \nabla_Y Z) = g([X, Z], Y).\) Since, \(X\) is an arbitrary and the metric is non-degenerate, \(2\nabla_Y Z = [Z, Y].\) This completes the proof of the theorem.

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

Proof: If \(\gamma(t) = \exp tX\) is a geodesic, then \(\gamma(t) = (dL_a \exp tX) X(1) = X(\gamma(t)).\)

And so \(\frac{d}{dt} \gamma = \nabla_X X = \frac{1}{2}[X, X] = 0.\)

Thus, \(\gamma(t)\) is a geodesic. Moreover, for all \(a \in N\) and for all \(v \in T_a M\) there is \(X \in g\) such that \(X(a) = v.\) Therefore, \(\gamma(t) = \exp tX\) is a geodesic with \(\gamma(0) = a, \gamma'(0) = X(a) = v.\) 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, \(\exp: g \rightarrow N\) 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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