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MAXIMAL NAGENDRAM Γ-SEMI SUB NEAR-FIELD SPACES OF A Γ-NEAR-FIELD SPACE OVER NEAR-FIELD

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ABSTRACT

In this paper we begin by proving the maximal Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field in a compact connected Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field.

We studied the characters of complex irreducible representation compact of Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field are linearly independent as elements of $C^{\infty}(N)$.

We examine the geometry of the adjoint representation to begin our proof that maximal Nagendram Γ-semi sub near-field spaces are conjugate.

Keywords: *maximal Nagendram Γ-semi sub near-field space, sub representation, representation,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.*

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SECTION 1: Maximal Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field.

Definition 1.1: A torus is a compact, connected abelian Nagendram Γ-semi sub near-field space. A maximal torus S of a Nagendram Γ-semi sub near-field space M is a torus Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field such that if S′ is any other torus Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field N and $S \subseteq S'$ then S = S′.

Example 1.2: Consider M = U(n).

The torus S = $\left\{ \begin{bmatrix} \lambda_1 & & & & \\ & \lambda_2 & & & \\ & & \ldots & & \\ & & & . & \\ & & & & \lambda_n \end{bmatrix} \middle| \, |\lambda_j| = 1 \right\} \cong S^n$ is a maximal torus. Suppose A is a matrix in U(n) that commutes with all elements of S. But every element of S is diagonal, and matrix theory tells us that a matrix that commutes with an arbitrary diagonal matrix is itself diagonal. Therefore, $A \in S$.

It is very much true that
(i) that maximal Nagendram Γ-semi sub near-field space exist
(ii) If N is compact and S_1, S_2 are two maximal Nagendram Γ-semi sub near-field spaces, then S_1 and S_2 are conjugate Nagendram Γ-semi sub near-field spaces i.e. there exists a $\in$ N so that $aS_1a^{-1} = S_2$.
(iii) If N is compact and connected Nagendram Γ-semi sub near-field spaces, then for any x $\in$ N there is a maximal torus S such that x $\in$ S.
(iv) If S $\leq$ N is a maximal torus, N compact and connected.
Then $N(S) = \{ x \in N / xSx^{-1} \subseteq S \}$.

The normalizer of S in N satisfies (a) W = N(S)/S is finite (N(S))/S (b) S/W $\cong$ N/N. We have the notion of the multiplicity $m_{U,W}$ U of an irreducible representation U in a

re presentation W. W = $\underset{U \in lxx(N)}{\oplus} m_{U,W}\ U$ where nU is the direct sum of n copies of U.

Lemma 1.3: Let N be a compact Nagendram Γ-semi sub near-field space. Then the map representations of N to characters of N, W $\mapsto$ χW.

Proof: Suppose W. W′ are two representations of N such that $\chi W = \chi W'$

Write W = $\underset{U \in lxx(N)}{\oplus} m_{U,W}\ U$, W′ = $\underset{U \in lxx(N)}{\oplus} m_{U,W'}\ U$.

Then, $\chi W = \underset{U \in lxx(N)}{\oplus} m_{U,W}\ \chi U = \underset{U \in lxx(N)}{\oplus} m_{U,W'}\ \chi U$

Since, $\{ \chi U \ / \ U \in lxx(N) \}$ is linearly dependent, $m_{U,W} = m_{U,W}{}'$ and hence W = W′.
This completes the proof of the lemma.

Proposition 1.4: Let N be a Nagendram Γ-semi sub near-field space. K $\subseteq$ N a connected abelian Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field N. Then, the closure $\overline{K}$ of K in N is also a connected abelian Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field.

Proof: Since the closure of a connected Γ-semi sub near-field space is connected, $\overline{K}$ is connected. We have only to argue that $\overline{K}$ is an abelian Nagendram Γ-semi sub near-field space. Suppose f : N x N $\to$ N, f (a, b) = ab^{-1} is continuous and since f (K x K) $\subseteq$ K , f ($\overline{K}$ x $\overline{K}$) = $f(\overline{K \times K}) \subseteq \overline{f(K)} \subseteq \overline{K}$, we see that $\overline{K}$ is a closed Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field N.
It remains to show that $\overline{K}$ is an abelian. For that x, y $\in$ K , $xyx^{-1} = y$ which also certainly holds if y $\in$ $\overline{K}$. But then, xyx^{-1} holds well, By the same argument this relation holds for all x, y $\in$ $\overline{K}$. This completes the proof of the proposition.

Lemma 1.5: Any compact Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field N with dim N > 0 has a torus S with dim S > 0.

Proof: Pick any X $\in$ g, then { exp tX / t $\in$ R } $\subseteq$ N is a connected abelian Nagendram Γ-semi sub near-field space. Hence its closure is a closed connected abelian Nagendram Γ-semi sub near-field space of Γ-near-field space over near-field N. since N is compact { exp tX / t $\in$ R } is a torus. This tells us at least tori /torus exist as Nagendram Γ-semi sub near-field spaces which compact of Γ-near-field space over near-field N.

Note 1.6: Let N be a compact Nagendram Γ-semi sub near-field space of Γ-near-field space over near-field and g its algebras. The maximal tori of N are in one to one correspondence with maximal abelian its sub algebras of g.

Note 1.7: Let N be a torus N = g /Z_N where Z_N is the integral lattice. Let Z_N^+ denote the weight lattice. For X $\in$ g, { $\overline{\exp tX / t \in R}$ } = N if and only if $\eta(X) \neq 0$ for any $0 \neq \eta \in Z_N$.

SECTION 2: Geometry of the Adjoint Representation.

Consider N = SO(3) we have seen that so(3) is the set of 3x3 skew – symmetric real matrices. For w = $(w_1, w_2, w_3) \in R^3$ and $x \in R^3$ define w x x = $\begin{bmatrix} 0 & -w_3 & w_2 \\ w_3 & 0 & -w_1 \\ -w_2 & w_1 & 0 \end{bmatrix}$. For A $\in$ SO(3) we have A (w x x) = Aw x Ax. So,

(Aw) x x = A $\begin{bmatrix} 0 & -w_3 & w_2 \\ w_3 & 0 & -w_1 \\ -w_2 & w_1 & 0 \end{bmatrix}$ A^{-1} x. Thus, the map $\phi : R^3 \to so(3)$, ϕ (w) = $\begin{bmatrix} 0 & -w_3 & w_2 \\ w_3 & 0 & -w_1 \\ -w_2 & w_1 & 0 \end{bmatrix}$ satisfies $\phi(AW) = A\phi(w)A^{-1} = Ad(A)\phi(w)$. Therefore the orbits of the action of SO(3) are 2 – spheres and 0. Now consider, the Adjoint action of N on *g* given by *g* . X = Ad(*g*) X.

If *xi* $\in$ *g* we have Ad(exp tξ) X = $e^{t\, ad(\xi)}$ X and so, denoting the induced vector field of this action by ξ_g we have ξ_g (X) $= \dfrac{d}{dt}\Big|_{t=0} e^{t\, ad(\xi)} X = ad(\xi)X = |\xi,\ X\,|$.

Let use observe, $N_X = \{g \in N \,/\, Ad(g)X = X\}$
$gX = \{\xi \in g \,/\, |\,\xi, X\,| = 0\} = \ker\{ad(X) : g \to g\}$
$S_x(N \,.\, X) = \{\xi_M(X) \,/\, \xi \in g\} = \{|\xi, X\,| / \xi \in g\} = Im\{ad(X) : g \to g\}$.

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