International Journal of Mathematical Archive-10(1), 2019, 47-53
Available online through www.ijma.info ISSN 2229 – 5046

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

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(Received On: 23-12-18; Revised & Accepted On: 16-01-19)

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.*

2000 Mathematics Subject Classification: *43A10, 46B28, 46H25,6H99, 46L10, 46M20, 51 M 10, 51 F 15,03 B 30.*

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 $S = \left\{ \begin{bmatrix} \lambda_1 & & & \\ & \lambda_2 & & \\ & & \ddots & \\ & & & \lambda_n \end{bmatrix} \middle| \, |\lambda_j| = 1 \right\} \cong S^n$ 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. $W = \bigoplus_{U \in lxx(N)} m_{U,W}\, U$ 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, $W \mapsto \chi W$.

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

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

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

Since, { χU / $U \in lxx(N)$ } 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 $w \times x = \begin{bmatrix} 0 & -w_3 & w_2 \\ w_3 & 0 & -w_1 \\ -w_2 & w_1 & 0 \end{bmatrix}$. For $A \in SO(3)$ we have $A(w \times x) = Aw \times Ax$. So, $(Aw) \times x = A \begin{bmatrix} 0 & -w_3 & w_2 \\ w_3 & 0 & -w_1 \\ -w_2 & w_1 & 0 \end{bmatrix} A^{-1} x$. Thus, the map $\phi : R^3 \to so(3)$, $\phi(w) = \begin{bmatrix} 0 & -w_3 & w_2 \\ w_3 & 0 & -w_1 \\ -w_2 & w_1 & 0 \end{bmatrix}$ 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 $Ad(\exp t\xi)\, X = e^{t\, ad(\xi)} X$ and so, denoting the induced vector field of this action by ξ_g we have $\xi_g(X) = \left.\frac{d}{dt}\right|_{t=0} e^{t\ ad(\xi)} X = ad(\xi)X = |\xi,\ X|$.

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

ACKNOWLEDGMENT

Dr T V Pradeep Kumar, Guide and Dr N V Nagendram being a Professor is indebted to the referee for his various valuable comments leading to the improvement of the advanced research article in algebra of Mathematics. For the academic and financial year 2019, this work was supported by the Hon'ble chairman Sri B. Srinivasa Rao, Kakinada Institute of Technology & Science (K.I.T.S.), R&D education Department Humanities & sciences (Mathematics), Divili 533 433. Andhra Pradesh INDIA.

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Source of support: Nil, Conflict of interest: None Declared.