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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 obtain the notion of characters of Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field almost with few of their characterizations. We also present the interesting relations on orthogonality characters of Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field.

Keywords: *characters of 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 characters of Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field and discussed about orthogonality characters of Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field.

Definition 1.1: Characters of Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field. Let N be a Nagendram Γ-semi sub near-field space ***K*** of a Γ-near-field space over near-field and $\rho : N \to NL(V)$ a complex representation. The character of the representation is defined as the function $\chi_{p} = \chi_{V} : N \to C$ and $\chi_V(g) = tx(\rho(g))$.

Note 1.2: If S, T are complex matrices such that tr(ST) = tr (TS) then tr (STS^{-1}) = tr (S). So tr is independent of the chosen basis. Also, if $M : V \to V$ is linear, $\{v_1, v_2, ..., v_n\}$ is a basis of V. $v_1^*, v_2^*,....., v_n^*$ the corresponding dual basis of V^* then tr (M) = $\sum_i v_i^*\left(M\left(v_i\right)\right)$.

If V is a representation of N, then V^* = Hom (V, C)is the dual representation of N. If N is compact, we may choose a N-invariant. Hermitian inner product (.) on V. This gives a N-equivalent complex anti-linear map $V \to V^*$ $v \mapsto (,v,\cdot)$. This gives an isomorphism $V^* \cong \overline{V}$ where $\overline{V}$ is the complex Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field with the same addition as V and scalar multiplication is given by $\lambda . V = \overline{\lambda}$ v and $\lambda \in C$, $v \in V$.

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

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

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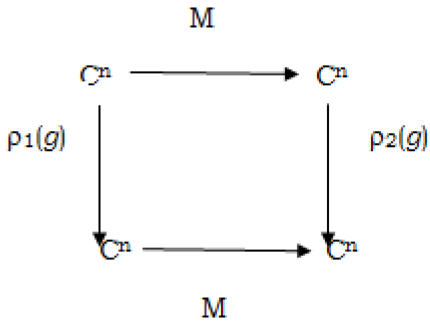
Proposition 2.1: Let N be a Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field. Then
(a) a character of a representation of N is a C^{∞} function on N,
(b) if V and W are isomorphic representations of N, then $\chi_V = \chi_W$
(c) $\chi_V (ghg^{-1}) = \chi_V (h)$, for all $g, h \in$ N,
(d) $\chi_V \oplus W = \chi_V + \chi_V W$
(e) $\chi_V \oplus W = \chi_V \chi W$,
(f) $\chi_V \cdot (g) = \chi \overline{V} (g) = \overline{\chi V(g)} = \chi_V (g^{-1})$
(g) $\chi_V (1) = \dim_C (V)$.

Proof: Given N be a Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field.
(a): By definition of character of Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field and $\rho : N \to NL(V)$ a complex representation. The character of the representation is defined as the function $\chi_p = \chi_V : N \to C$ and $\chi_V (g) = tx (\rho(g))$ is a complex representation on from C^{∞} on N. hence it is obvious that a character of a representation of N is a C^{∞} function on N. Hence Proved (a).

(b): If $\rho_1 , \rho_2 : N \to NL(n, C)$ are two representations and



Commutes then $tr (\rho_2(g)) = tr (M \rho_2(g) M^{-1}) = tr (\rho_1(g))$. Proved (b).
(c) $Tr (\rho(ghg^{-1})) = tr ((\rho(g) (\rho(h) (\rho(g^{-1})) = tr (\rho(h)$
(d) and (e) recall from linear algebra that if $S : V \to W$ and $T : V \to V$ are linear, then $tr (S \oplus T) = tr (S) + tr (T)$ and $tr (S \otimes T) = tr (S).\ tr (T)$.
(f) If $\rho : N \to NL(V)$ is a representation, $(v_1, v_2, ..., v_n)$ is a basis for V and $v_1^*, v_2^*, v_3^*,....., v_n^*$ is the associated dual basis, then

$$\chi_\rho^* (g) = tr (\rho^* (g)) = \sum_i v_i \left(\rho^*(g) v_i^*\right) = \sum_i v_i^* \left(\rho\left(g^{-1}\right) v_i\right) = \chi_\rho (g^{-1}).$$

If (,) is an invariant Hermitian inner product, and $\{ v_i \}$ is an orthogonal basis, then

$$\begin{aligned} tr\ \rho^*(g) &= \sum_i (v_i , .) \circ \rho\left(g^{-1}\right)\ v_i \\ &= \sum_i (v_i , \rho\left(g^{-1}\right)\ v_i\ ) \\ &= \sum_i (\rho(g) v_i , v_i) \\ &= \sum_i ((\rho(g))_{j\,i}\, v_j , v_i) \\ &= \sum_i \overline{(\rho(g))_{j\,i}} (v_j , v_i) \\ &= \sum \overline{\rho(g)_{i\,i}} = \overline{\chi_\rho (g)} . \end{aligned}$$

(g) $\chi_V (1) = tr (id) = \dim_C V$
This completes the proof of the proposition.

Proposition 2.2: Let $\rho : N \to NL(V)$ be a representation of N and $V^G = \{ g \in V : g. v = v \}$.
Then $\int_N \chi_V (g)\, dg = \dim_C V$.

Proof:
Consider $Q : V \to V$ given by $Q(V) = \int_N \rho(g)\ v\ dg$. We claim that Q is a linear N-equivalent map such that $Q(V) \subseteq V^N$ and $Q\, |V^N = id_V{}^N$.

It is clear that Q is linear. Now,

$$Q(\rho(a)\,v) = \int_N \rho(g)\,\rho(a)\,v\,dg = \int_N \rho(ag)\;v\,dg = \int_N \rho(g)\;v\,dg = Q(v) = \int_N \rho(ag)\;v\,dg$$

$$= \rho(a) \int_N \rho(g)\;dg = \rho(a)\,Q(v)$$

and so Q (v) $\subseteq V^N$ and Q (ρ(a) . v) = Q (v) for all g ∈ N and v ∈ V. Also if v ∈ V^N we have

$$Q(v) = \int_N \rho(g)\;c\,dg = \int_N v\,dg = v. \text{ since } \int_N 1\;dg = 1.$$

This claim implies that tr (Q) = dim V^N On the other hand.

$$\mathrm{Tr}(Q) = \sum v_i^*\,(Q(v_i)) = \sum v_i^* \left(\int_N \rho(g)\;v_i\;dg \right) = \int_N (\chi_V(g)\;)dg = \int_N \rho(g)\,\rho(a)\,v\,dg\,.$$

This completes the proof of the proposition.

SECTION 3: ORTHOGONALITY OF CHARACTERS OF NAGENDRAM GAMMA SEMI SUB NEAR-FIELD SPACES OF A GAMMA NEAR-FIELD SPACE OVER A NEAR-FIELD.

In this section, author present main result on Orthogonality of characters of Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field.

Theorem 3.1: Let L, M be two compact representations of a compact Nagendram Gamma semi sub near-field spaces of a Gamma near-field space over a near-field N. Then $(\chi_L, \chi_M) = \int_N \chi_L(g)\,\chi_M(g)\,dg = \dim_C (L, M)$.

In particular, if L, M are irreducible, then $(\chi_L, \chi_M) = \begin{cases} 0 & L \cong M \\ 1 & L \text{ not} \cong M \end{cases}$

Proof:

$\overline{\chi_L}\;\chi_M = \chi_L . \chi_M = \chi_M \otimes V^* = X_{Hom(L,M)}$ Since, $M \otimes V^* \cong$ Hom (L, M).

Hom (L, M $)^N$ = Hom_N (L, M) by proposition 2.2,

$$\int_N \left(\overline{\chi_L}\;\chi_M\right)(g)\,dg = \int_N \chi_{Hom}\;(L,M)\,(g)\,dg = \mathrm{Hom}(L, M)^N = \mathrm{Hom}_N(L, M).$$

This completes the proof of the theorem.

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