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REPRESENTATION OF 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 recall a representation of Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field from N to the general linear near-field space of some finite dimensional near-field space by defining a mapping ρ : N → NL(N) be such a representation. With the basic information available is being derived irreducibility representations of T^n, SU (2), SL(2, C) I and SL(2, C) , complexification of Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field.

Keywords: *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, smooth, space deformation retracts, Nagendram Γ-semi near-field space, closed Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field.*

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SECTION 1: REPRESENTATION OF NAGENDRAM Γ-SEMI SUB NEAR-FIELD SPACES OF A Γ-NEAR-FIELD SPACE OVER NEAR-FIELD.

Definition 1.1: A sub-representation is a Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field $W \subseteq N$ such that for any $g \in N$, $w \in W$ we have $\rho(g)w \in W$. In other words, W is a N-invariant Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field.

If $\rho_1 : N \to NL(N_1)$ and $\rho_2 : N \to NL(N_2)$ are two representations of N, then we have $\rho_1 \oplus \rho_2 : N \to NL(N_1 \oplus N_2)$; $(\rho_1 \oplus \rho_2)(g(n_1 + n_2)) = \rho_1(g(n_1)) + \rho_2(g(n_2))$.

A representation (either real or complex) $\rho : N \to NL(N)$ is irreducible if it has no nontrivial invariant Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field if $W \subseteq N$ is such that $\rho(g)W \subseteq W$ for all $g \in N$ then either W = {0} or W = N.

Example 1.2: $\rho : S' \to NL(1, C)$ given by $\rho(\lambda)$ is lambda is irreducible since dim C = 1.

Example 1.3: $\rho : SU(2) \to NL(2, C)$ is irreducible. SU(2) acts transitively on S^3 and span $C(S^3) = C^2$.

Example 1.4: $\rho : R \to N : (2, R)$ given by $\rho(t) = \begin{bmatrix} 1 & t \\ 0 & 1 \end{bmatrix}$ is not irreducible R x {0} is invariant.

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Definition 1.5: A complex representation $\rho : N \to NL(N)$ is unitary if there is a Hermitian inner product $< , >$ on N such that $< \rho(g)v, \rho(g)w > = <v>w$, $\forall\, g \in N$, $\forall\, v, w \in N$ i.e. the representation of N on N preserves $< , >$.

Example 1.6: $\rho : S' \to NL(2, C)$ given by $\rho(e^{i\theta})z = e^{i\theta}z$ is unitary but not irreducible C_z is invariant Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field for any z.

Lemma 1.7: Let $\rho : N \to NL(N)$ be a unitary representation then ρ is a direct sum of irreducible representations.

Proof: This we can prove by induction on $\dim_C(N)$. If $\dim_C(N) = 1$, then ρ is irreducible. Suppose $\dim_C N > 1$ and N is not irreducible. Then there exists an N-invariant Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field W, $\dim_C W \neq \dim_C N$. Let $W^{\perp}$ denote the orthogonal complement Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field of W with respect to the Hermitian inner product on N.

Claim: $W^{\perp}$ is invariant Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field of W.

To prove that,

Let us take $v \in W^{\perp}$ the for any $w \in W$ and $\forall\, g \in N$ $< \rho^{-1}(N)w, v > = < \rho(g)\rho(g^{-1})w, \rho(g)v > = < w, \rho(g)v >$. Since, W is invariant Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field of N, $\rho(g^{-1})w \in W$ and so $0 = < \rho(g^{-1})w, v > = < w, \rho(g)v >$. Hence $\rho(g)v \in W^{\perp}$ for all $g \in N$. Thus, $N = W \oplus W^{\perp}$ where by induction and assumption both W and $W^{\perp}$ are invariant Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field of N. This completes the proof of the lemma.

Definition 1.8: A representation $\rho : N \to NL(N)$ is completely reducible if it is a direct sum of irreducible representation.

Example 1.9: The representation rho: $N \to NL(2, C)$ is neither irreducible nor completely reducible. C x {0} is invariant. If $w \notin C \times \{0\}$ say $w = (w_1, w_2)$ then $w_2 \neq 0$. So $\begin{bmatrix} 1 & t \\ 0 & 1 \end{bmatrix}\begin{bmatrix} w_1 \\ w_2 \end{bmatrix} = \begin{bmatrix} w_1 + tw_2 \\ w_2 \end{bmatrix}$. Set $t = - w_1/w_2$ so that $\rho(t^2)w = w_2\begin{bmatrix} t \\ 1 \end{bmatrix}$.

Hence span $_C \left\{ \rho(t)\begin{bmatrix} w_1 \\ w_2 \end{bmatrix} \text{ such that } t \in C \right\} = C^2$.

Proposition 1.10: Any complex representation of a finite invariant Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field of N is unitary.

Proof: Let $\rho : N \to NL(N)$ be a representation. Pick a Hermitian inner product $<, >$ on N. It need not be invariant Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field of N.

Now define $<< v, w >> = \frac{1}{|N|}\sum_{g \in N} < \rho(g)v,\ \rho(g)w >$ where | N | is the cardinal number in N. then for any $a \in N$, $v, w \in N$.

Consider, $<< \rho(a)v, \rho(a)w >> = \frac{1}{|N|}\sum_{g \in N} < \rho(g)\rho(a)v,\ \rho(g)\rho(a)w > = \frac{1}{|N|}\sum_{g \in N} < \rho(ga)v,\ \rho(ga)w >$

But, $R_a : N \to N$ is a bijection. So let $g' = ga$. then the last equality becomes

$\frac{1}{|N|}\sum_{g' \in N} < \rho(g')v,\ \rho(g')w > = << v, w >>$.

It follows that $<< , >>$ is invariant Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field of N. It is clear that $<< , >>$ is sesquillinear and moreover for $v \neq 0$, $<< v, v >> > 0$. Hence $<< , >>$ is an invariant Hermitian inner product as well as Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field of N. This completes the proof of the proposition.

I being an author and in depth study makes me to do the same thing for Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field of N if < , > is a Hermitian inner product on a representation $\rho : N \to NL(N)$ of N the for fixed v, w $\in$ N g $\mapsto$ < ρ(g)v, ρ(g)w > is a function on N.

Also for v ≠ 0 , $f_v(g)$ = < ρ(g)v, ρ(g)w > > 0 for all g. Thus for an appropriate measure $d\mu_g$ we have, $\int_N f_v(g)\, d\mu_g$ > 0. If | N | = $\int_N \mu_g < \infty$, then << v, w >> = $\frac{1}{|N|}\sum_N < \rho(g)v,\ \rho(g)w > d\mu_g$ makes sense and is a Hermitian inner product.

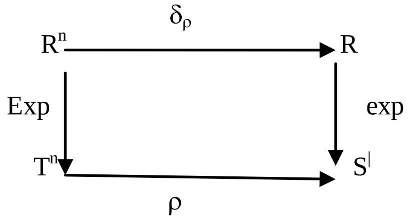
Note 1.11: Any representation of a compact Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field of N is completely reducible.

SECTION 2: IRREDUCIBLE REPRESENTATIONS OF T^N AND REPRESENTATIONS OF SU (2), REPRESENTATIONS OF SL(2, C) I AND SL(2, C) II.

Lemma 2.1: Any complex irreducible representation $\rho : T^n \to NL(N)$ is of the form ρ (exp v) = ρ (v mod Z^n) = $e^{2\pi i\delta\rho(v)}$ where $\delta_\rho : N^n \to N^n$ satisfies $\delta_\rho(Z^n) \subseteq Z^n$ i.e. $\delta_\rho \in Hom_Z(Z^n, Z)$.

Proof:
(⇒) If $\mu \in Hom_Z(Z^n, Z) \subseteq Hom_N(N^n, N)$ then $\xi_\mu : N^n/Z^n \to N/Z$ and ξ_μ (v, mod Z^n) = μ(v) mod Z is well defined. we identify N/Z with $S^|$: a mod Z $\mapsto e^{2\pi ia}$. So ξ_μ is a representation $\xi_\mu : T^n \to NL(C)$ and ξ_μ (v mod Z^n) = $e^{2\pi i(v)}$.

(⇐)Converse: Suppose that $\rho : T^n \to NL(C) \cong C \setminus \{0\}$ is a representation. Since $\rho(T^m) \subseteq C^x$ is compact, $\rho(T^n) \subseteq S^|$. we have a commuting diagram



So δ_ρ (ker exp) ⊆ ker exp = Z. Therefore, $\delta_\rho \in Hom_Z(Z^n, Z)$. This proves irreducible, unitary representations of N are in one-one correspondence with elements of the weight lattice. This completes the proof of the lemma.

Definition 2.2: If N is any compact, connected abelian Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field of N i.e. a torus Z_N= ker{exp : g → N } is called the integral lattice. The set $Z^*_N = Hom_Z(Z_N, Z)$ is called the weight lattice.

Note 2.5: Representations of SU (2):

We start constructing complex irreducible representation of SU(n). let V_n be the set of all complex homogeneous polynomials of degree n in two variables. i.e. $v_n = span_C\{ z_1^n, z_1^{n-1}, ..., z_2^n\}$ note that V_0 = C and $V_1 \cong C^2$. We have an action of NL(2, C) on V_n.

(A . *f*) (z_1, z_2) = *f* ((z_1,z_2)A) where (z_1, z_2)A is regarded as matrix multiplication.

It is left as an exercise to the reader to prove this indeed defines an action. This also gives us a representation A. (λ*f* + μ*g*) = λ (A.*f*) + μ (A.*g*) for all λ, μ ∈ C , *f* , *g* ∈ V_n and A ∈ NL(2, C).

Note 2.4: Let V_n be as above defined. Then (i) V_n is an irreducible representation of SU(n) for all n ≥ 0 (ii) If V is an irreducible representation of SU(n) of dimension n + 1 then V ≅ V_n as representations.

Representation of SL(2, C) I:

Lemma 2.5: There is a bijection between complex representations of SU(2) and of SL(2, C).

Proof: Since π_1SU(2) is trivial, there is a bijection between representations of SU(2) and su(2). Any complex representation of su(2) extends to a unique complex representation of $SL(2)_C$ = SL(s, C).

Conversely, a representation of SL(2, C) restricts to a representation of su(2) ⊆ sl(2, C).

This completes the proof of the lemma.

Lemma 2.6: Any finite dimensional complex representations of SL(2, C) is completely reducible.

Proof: Obvious that representations of SU(2) are completely reducible.

Theorem 2.7: Irreducible representations of SL(2, C) are classified by non-negative integers for any n = 0, 1, 2, ... there exists a unique representation of SL(2, C) of dimension n + 1 we observe [H, E] = 2E, [H, F] = - 2F , [E, F] = H.

Lemma 2.8: Let τ : SL(2, C) $\to$ NL(N) be a representation. Suppose τ (H)n = cn for some c $\in$ C. Then τ (H)(τ (E)n) = (c + 2) (τ (E)n) and τ (H)(τ (F)n) = (c - 2) (τ (F)n).

Proof : 2 τ (E)n = τ ([H, E])n = τ (H) τ (H) τ (E)n - τ (E) τ (H)n = τ (H)(τ (E)n) - c τ (E)n
and so τ (H)(τ (E)n) = (c + 2) τ (E)n.

$\therefore$ - 2 τ (F)n = τ ([H, F])n) = τ ([H, F]n) - c τ (F)n and so τ ([H, F]n) - (c - 2) (τ (F)n).

This completes the proof of the lemma.

Note 2.9: for k = 1,2,3,..... we see that by induction τ (H)($\tau(E)^k$n) = (c + 2k)($\tau(E)^k$n). But, τ (H) has only finitely many eigenvalues and so there exists k ≥ 1 such that $\tau(E)^k$n =0, $\tau(E)^{k-1}$n ≠ 0. We conclude that there exists a $n_0 \in$ N such that $n_0 \neq 0$, τ (E)n_0 = 0 and τ (H)n_0 = λn_0 for some $\lambda \in$ C.

Representation of SL(2, C) II:

Lemma 2.10: Let τ : SL(2, C) $\to$ NL(N) be a representation , $n_0 \in$ N. let $n_k = \dfrac{1}{k!}\tau(F)^k n_0$ and $n_{-1} \equiv 0$. Then

(i) τ (H)n_k = (λ - 2k)n_k,
(ii) τ (F)n_k = (k + 1) n_{k+1}
(iii) τ (E)n_k = (λ - k +1)n_{k-1}.

Proof: To prove (i):

Let τ : SL(2, C) $\to$ NL(N) be a representation. Suppose τ (H)n = cn for some c $\in$ C. Then τ (H)(τ (E)n) = (c + 2) (τ (E)n) and τ (H)(τ (F)n) = (c - 2) (τ (F)n).
Proved (i).

To prove (ii):

τ (F)n_k = τ (F)($\dfrac{1}{k!}\tau(F)^k n_0$) = (k + 1) $\left[\dfrac{1}{(k+1)!}\tau(F)^{k+1} n_0\right]$ proved (ii).

To prove (iii):

Proceed by induction on k : τ (E)n_0 = (λ + 1) n_{-1} = 0.

Now k τ (E)n_k = τ (E)(τ (F)n_{k-1}) = ((τ (E) τ (F) - τ (F) τ (E) + τ (F) τ (E)n_{k-1}
= τ (H)n_{k-1} + τ (F)(τ (E)n_{k-1})
= (λ - 2(k-1))n_{k-1} + τ (F)((λ - (k -1) + 1)n_{k-2})
= ((λ - 2k + 2) + (λ - k + 2)(k – 1))n_{k-1}
= k(λ - k + 1)n_{k-1}
Hence τ (E)n_k = (λ - k + 1)n_{k-1}.
Proved (iii).

This completes the proof of the lemma.

Note 2.11: Let τ : AL(2, C) $\to$ NL(N) be a representation and H = $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$ Then, τ (H) is diagonalizable i.e. Nagendram Γ-semi sub near-field spaces of a Γ-near-field space over near-field N has a basis of eigenvectors.

SECTION 3: COMPLEXIFICATION OF NAGENDRAM Γ-SEMI SUB NEAR-FIELD SPACES OF A Γ-NEAR-FIELD SPACE OVER NEAR-FIELD.

Definition 3.1: Let N be Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field. The complexification N_C of N is $N \otimes C$.

Let N_C is a complex Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field for any a, b, c $\in$ C, n $\in$ N we have a (n $\otimes$ b) = n $\otimes$ ab. Also N is embedded in N_C as a real Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field $N \mapsto N_C$, $n \mapsto n \otimes I$.

We now identify N with $N \otimes I \subseteq N_C$ and we write an for n $\otimes$ a, n $\in$ N, a $\in$ C.

As a real Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field, $N_C = N \otimes i N$,
where $i N = \{n \otimes i / n \in N \}$.

Note 3.2: If { $n_1, n_2, \ldots, n_n$ } is a basis of Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field N, then it is also a complex basis of N_C. considered as a real Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field, N_C has a basis the set { $n_1, n_2, \ldots, n_n, i n_1, i n_2, \ldots, i n_n$ }.

Lemma 3.3: Let N be a real Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field, W a complex Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field and T : N $\to$ W on a R – linear map. Then, there exists a unique C-linear map $T_C : N_C \to W$ extending T.

Proof: Uniqueness. for any s, t $\in$ N we have $T_C (s + i t) = T_C (s) + i T_C(t) = T(s) + i T(t)$.
Existence. Let { $n_1, n_2, \ldots, n_n$ } be a basis for N. we define $T_C (\sum a_i n_i) = \sum a_i T(n_i)$ for $a_i \in$ C. Then T_C is complex linear and extends T. By uniqueness, T_C does not depend on the choice of basis.

Lemma 3.4: Let N be a real Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field, W a complex Nagendram Γ-semi sub near-field space of a Γ-near-field space over near-field and b : N x N $\to$ W and R – bilinear map. Then, there exists a unique C-bilinear map $b_C : N_C \times N_C \to W$ extending b.

Corollary 3.5: If g is a real Nagendram algebras then the Nagendram bracket on g extends to a unique C-bilinear map $[\ ,\ ]_C : g_C \times g_C \to g_C$ such that (g_C, $[,]_C$) is a Nagendram algebras.

Example 3.6: SU(2) $\cong$ SL(2, C) to see this first let T : SU(2) $\to$ SL(2, C) denote the inclusion. Then, there exists a unique T_C : SU(2) $\to$ SL(2, C) extending T now SU(2) = $\text{span}_g \left\{ \begin{bmatrix} i & 0 \\ 0 & -i \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix} \right\}$ so that $SU(2)_C$ is the complex span of the same matrices.

Let H = $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$; E = $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$; F = $\begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}$. Then, SL(2, C) = span_C [H, E, F]. But,

H = $(-i) \begin{bmatrix} i & 0 \\ 0 & -i \end{bmatrix} \in T_C$ (SU(2)) ; E = $\frac{1}{2}\left(\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix} - i \begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix} \right) \in T_C(SU(2)_C)$

And F = $\frac{1}{2}\left((-i) \begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix} - \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix} \right) \in T_C(SU(2)_C)$. Thus T_C is onto and hence an isomorphism by dimension count.

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REFERENCES

1. G. L. Booth A note on Γ-near-rings Stud. Sci. Math. Hung. 23 (1988) 471-475.
2. G. L. Booth Jacobson radicals of Γ-near-rings Proceedings of the Hobart Conference, Longman Sci. & Technical (1987) 1-12.
3. G Pilz Near-rings, Amsterdam, North Holland.
4. P. S. Das Fuzzy groups and level subgroups J. Math. Anal. and Appl. 84 (1981) 264-269.
5. V. N. Dixit, R. Kumar and N. Ajal On fuzzy rings Fuzzy Sets and Systems 49 (1992) 205-213.
6. S. M. Hong and Y. B. Jun A note on fuzzy ideals in Γ-rings Bull. Honam Math. Soc. 12 (1995) 39-48.
7. Y. B. Jun and S. Lajos Fuzzy (1; 2)-ideals in semigroups PU. M. A. 8(1) (1997) 67-74.
8. Y. B. Jun and C. Y. Lee Fuzzy □-rings Pusan Kyongnam Math. J. 8(2) (1992) 163-170.
9. Y. B. Jun, J. Neggers and H. S. Kim Normal L-fuzzy ideals in semirings Fuzzy Sets and Systems 82 (1996) 383-386.
10. N V Nagendram,T V Pradeep Kumar and Y V Reddy On “Semi Noetherian Regular Matrix δ–Near-Rings and their extensions”, International Journal of Advances in Algebra (IJAA), Jordan, ISSN 0973 - 6964, Vol.4, No.1, (2011), pp.51-55.
11. N V Nagendram,T V Pradeep Kumar and Y V Reddy “A Note on Bounded Matrices over a Noetherian Regular Delta Near Rings”, (BMNR-delta-NR) published in International Journal of Contemporary Mathematics, Vol.2, No.1, June 2011, Copyright@MindReaderPublications, ISSNNo:0973-6298, pp.13-19.
12. N V Nagendram,T V Pradeep Kumar and Y V Reddy “A Note on Boolean Regular Near-Rings and Boolean Regular δ–Near Rings”, (BR-delta-NR) published in International Journal of Contemporary Mathematics, IJCM Int. J. of Contemporary Mathematics ,Vol. 2, No. 1, June 2011, Copyright @ Mind Reader Publications, ISSN No: 0973-6298, pp. 29 - 34.
13. N V Nagendram, T V Pradeep Kumar and Y V Reddy “on p-Regular δ–Near-Rings and their extensions”, (PR-delta-NR) accepted and to be published in int. J. Contemporary Mathematics (IJCM),0973-6298,vol.1, no.2, pp.81-85, June 2011.
14. N V Nagendram, T V Pradeep Kumar and Y V Reddy “On Strongly Semi –Prime over Noetherian Regular δ–Near Rings and their extensions”, (SSPNR-delta-NR) published in International Journal of Contemporary Mathematics, Vol.2, No.1, June 2011, , pp.83-90.
15. N V Nagendram, Dr T V Pradeep Kumar and Dr Y V Reddy “On Structure Theory and Planar of Noetherian Regular δ-Near–Rings (STPLNR-delta-NR)”,International Journal of Contemporary Mathematics, IJCM ,published by IJSMA, pp.79-83, Dec, 2011.
16. N V Nagendram, Dr T V Pradeep Kumar and Dr Y V Reddy “On Matrix’s Maps over Planar of Noetherian Regular δ-Near–Rings (MMPLNR-delta-NR)”,International Journal of Contemporary Mathematics ,IJCM, published by IJSMA, pp.203-211, Dec, 2011.
17. N V Nagendram, Dr T V Pradeep Kumar and Dr Y V Reddy “On IFP Ideals on Noetherian Regular-δ- Near Rings(IFPINR-delta-NR)”, Int. J. of Contemporary Mathematics, Copyright @ Mind Reader Publications, ISSN No: 0973-6298, Vol. 2, No. 1, pp.53-58, June 2011.
18. N V Nagendram, B Ramesh paper "A Note on Asymptotic value of the Maximal size of a Graph with rainbow connection number 2*(AVM-SGR-CN2*)" published in an International Journal of Advances in Algebra(IJAA) Jordan @ Research India Publications, Rohini, New Delhi, ISSN 0973-6964 Volume 5, Number 2 (2012), pp. 103-112.
19. N V Nagendram research paper on "Near Left Almost Near-Fields (N-LA-NF)" communicated to for 2nd intenational conference by International Journal of Mathematical Sciences and Applications, IJMSA @mindreader publications, New Delhi on 23-04-2012 also for publication.
20. N V Nagendram, T Radha Rani, Dr T V Pradeep Kumar and Dr Y V Reddy “A Generalized Near Fields and (m, n) Bi-Ideals over Noetherian regular Delta-near rings (GNF-(m, n) BI-NR-delta-NR)", published in an International Journal of Theoretical Mathematics and Applications (TMA),Greece,Athens,dated 08-04-2012.
21. N V Nagendram, Smt.T.Radha Rani, Dr T V Pradeep Kumar and Dr Y V Reddy "Applications of Linear Programming on optimization of cool freezers(ALP-on-OCF)" Published in International Journal of Pure and Applied Mathematics, IJPAM-2012-17-670 ISSN-1314-0744 Vol-75 No-3(2011).
22. N V Nagendram "A Note on Algebra to spatial objects and Data Models(ASO-DM)" Published in international Journal American Journal of Mathematics and Mathematical Sciences, AJMMS,USA, Copyright @ Mind Reader Publications, Rohini, New Delhi, ISSN. 2250-3102, Vol.1, No.2 (Dec. 2012), pp. 233 – 247.
23. N V Nagendram, Ch Padma, Dr T V Pradeep Kumar and Dr Y V Reddy "A Note on Pi-Regularity and Pi-S-Unitality over Noetherian Regular Delta Near Rings(PI-R-PI-S-U-NR-Delta-NR)" Published in International Electronic Journal of Pure and Applied Mathematics, IeJPAM-2012-17-669 ISSN-1314-0744 Vol-75 No-4(2011).
24. N V Nagendram, Ch Padma, Dr T V Pradeep Kumar and Dr Y V Reddy "Ideal Comparability over Noetherian Regular Delta Near Rings(IC-NR-Delta-NR)" Published in International Journal of Advances in Algebra (IJAA, Jordan),ISSN 0973-6964 Vol:5, NO:1(2012),pp.43-53@ Research India publications, Rohini, New Delhi.

25. N. V. Nagendram, S. Venu Madava Sarma and T. V. Pradeep Kumar, "A Note On Sufficient Condition Of Hamiltonian Path To Complete Graphs (SC-HPCG)", IJMA-2(11), 2011, pp.1-6.
26. N V Nagendram,Dr T V Pradeep Kumar and Dr Y V Reddy "On Noetherian Regular Delta Near Rings and their Extensions(NR-delta-NR)",IJCMS,Bulgaria,IJCMS-5-8-2011,Vol.6,2011,No.6,255-262.
27. N V Nagendram, Dr T V Pradeep Kumar and Dr Y V Reddy "On Semi Noehterian Regular Matrix Delta Near Rings and their Extensions(SNRM-delta-NR)",Jordan,@ResearchIndiaPublications,AdvancesinAlgebraISSN 0973-6964 Volume 4, Number 1 (2011), pp.51-55© Research India Publicationspp.51-55
28. N V Nagendram, Dr T V Pradeep Kumar and Dr Y V Reddy "On Boolean Noetherian Regular Delta Near Ring(BNR-delta-NR)s",International Journal of Contemporary Mathematics,IJCM Int. J. of Contemporary Mathematics ,Vol. 2, No. 1-2,Jan-Dec 2011, Mind Reader Publications, ISSN No: 0973-6298,pp. 23-27.
29. N V Nagendram, Dr T V Pradeep Kumar and Dr Y V Reddy "On Bounded Matrix over a Noetherian Regular Delta Near Rings(BMNR-delta-NR)", Int. J. of Contemporary Mathematics,Vol. 2, No. 1-2, Jan-Dec 2011 ,Copyright @ Mind Reader Publications, ISSN No: 0973-6298, pp.11-16
30. N V Nagendram,Dr T V Pradeep Kumar and Dr Y V Reddy "On Strongly Semi Prime over Noetherian Regular Delta Near Rings and their Extensions(SSPNR-delta-NR)", Int. J. of Contemporary Mathematics,Vol. 2, No. 1, Jan-Dec 2011 ,Copyright @ Mind Reader Publications ,ISSN No: 0973-6298, pp.69-74.
31. N V Nagendram, Dr T V Pradeep Kumar and Dr Y V Reddy "On IFP Ideals on Noetherian Regular Delta Near Rings(IFPINR-delta-NR)", Int. J. of Contemporary Mathematics,Vol. 2, No. 1-2, Jan-Dec 2011, Copyright @ Mind Reader Publications, ISSN No: 0973-6298,pp.43-46.
32. N V Nagendram, Dr T V Pradeep Kumar and Dr Y V Reddy "On Structure Thoery and Planar of Noetherian Regular delta-Near–Rings (STPLNR-delta-NR)", International Journal of Contemporary Mathematics, IJCM ,accepted for Ist international conference conducted by IJSMA, New Delhi December 18,2011,pp:79-83,Copyright @ Mind Reader Publications and to be published in the month of Jan 2011.
33. N V Nagendram, Dr T V Pradeep Kumar and Dr Y V Reddy "On Matrix's Maps over Planar of Noetherian Regular delta-Near–Rings (MMPLNR-delta-NR)",International Journal of Contemporary Mathematics ,IJCM, accepted for Ist international conference conducted by IJSMA, New Delhi December 18, 2011, pp:203-211, Copyright @ Mind Reader Publications and to be published in the month of Jan 2011.
34. N V Nagendram, Dr T V Pradeep Kumar and Dr Y V Reddy "Some Fundamental Results on P- Regular delta-Near–Rings and their extensions (PNR-delta-NR)", International Journal of Contemporary Mathematics ,IJCM,Jan-December'2011,Copyright@MindReader Publications,ISSN:0973-6298, vol.2,No.1-2,PP.81-85.
35. N V Nagendram, Dr T V Pradeep Kumar and Dr Y V Reddy "A Generalized ideal based-zero divisor graphs of Noetherian regular Delta-near rings (GIBDNR- d-NR)" , International Journal of Theoretical Mathematics and Applications (TMA)accepted and published by TMA, Greece, Athens,ISSN:1792- 9687 (print),vol.1, no.1, 2011, 59-71, 1792-9709 (online),International Scientific Press, 2011.
36. N V Nagendram, Dr T V Pradeep Kumar and Dr Y V Reddy "Inversive Localization of Noetherian regular Delta-near rings (ILNR- Delta-NR)" , International Journal of Pure And Applied Mathematics published by IJPAM-2012-17-668, ISSN.1314-0744 vol-75 No-3,SOFIA,Bulgaria.
37. N VNagendram1, N Chandra Sekhara Rao2 "Optical Near field Mapping of Plasmonic Nano Prisms over Noetherian Regular Delta Near Fields (ONFMPN-NR-Delta-NR)" accepted for 2nd international Conference by International Journal of Mathematical Sciences and Applications, IJMSA @ mind reader publications, New Delhi going to conduct on 15 – 16 th December 2012 also for publication.
38. N V Nagendram, K V S K Murthy (Yoga), "A Note on Present Trends on Yoga Apart From Medicine Usage and Its Applications(PTYAFMUIA)" Pubished by the International Association of Journal of Yoga Therapy, IAYT 18 th August , 2012.
39. N VNagendram ,B Ramesh, Ch Padma , T Radha Rani and S V M Sarma research article "A Note on Finite Pseudo Artinian Regular Delta Near Fields (FP AR-Delta-NF)" communicated to International Journal of Advances in Algebra, IJAA, Jordan on 22 nd August 2012.
40. N V Nagendram "Amenability for dual concrete complete near-field spaces over a regular delta near-rings (ADC-NFS-R-δ-NR)" accepted for 3nd international Conference by International Journal of Mathematical Sciences and Applications, IJMSA @ mind reader publications, New Delhi going to conduct on 15 – 16 th December 2014 also for publication.
41. N V Nagendram "Characterization of near-field spaces over Baer-ideals" accepted for 4th international Conference by International Journal Conference of Mathematical Sciences and Applications, IJCMSA @ mind reader publications, New Delhi going to conduct on 19 – 20 th December 2015 at Asian Institute of Technology AIT, Klaung Lange 12120, Bangkok, Thailand.
42. N V Nagendram,, S V M Sarma Dr T V Pradeep Kumar " A note on sufficient condition of Hamiltonian path to Complete Graphs" published in International Journal of Mathematical archive IJMA, ISSN 2229-5046, Vol.2, No..2, Pg. 2113 – 2118, 2011.
43. N V Nagendram, S V M Sarma, Dr T V Pradeep Kumar "A note on Relations between Barnette and Sparse Graphs" publishd in an International Journal of Mathematical Archive (IJMA), An International Peer Review Journal for Mathematical, Science & Computing Professionals, 2(12),2011, pg no.2538-2542,ISSN 2229 – 5046.

44. N V Nagendram "On Semi Modules over Artinian Regular Delta Near Rings(S Modules-AR-Delta-NR) Accepted and published in an International Journal of Mathematical Archive (IJMA)", An International Peer Review Journal for Mathematical, Science & Computing Professionals ISSN 2229-5046, IJMA-3-474,2012.
45. N V Nagendram "A note on Generating Near-field efficiently Theorem from Algebraic K - Theory" published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.3, No.10, Pg. 1 – 8, 2012.
46. N V Nagendram and B Ramesh on "Polynomials over Euclidean Domain in Noetherian Regular Delta Near Ring Some Problems related to Near Fields of Mappings(PED-NR-Delta-NR & SPR-NF)" Accepted and published in an International Journal of Mathematical Archive (IJMA), An International Peer Review Journal for Mathematical, Science & Computing Professionals ISSN 2229-5046,vol.3,no.8,pp no. 2998-3002,2012.
47. N V Nagendram "Semi Simple near-fields Generating efficiently Theorem from Algebraic K - Theory" published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.3, No.12, Pg. 1 – 7, 2012.
48. N V Nagendram "---------------------------" published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.3, No.10, Pg. 3612 –3619, 2012.
49. N V Nagendram, E Sudeeshna Susila, "Applications of linear infinite dimensional system in a Hilbert space and its characterizations in engg. Maths (AL FD S HS & EM)", IJMA, ISSN.2229-5046, Vol.4, No.7, Pg. 1 – 11 (19 – 29), 2013.
50. N VNagendram, Dr T V Pradeep Kumar, "Compactness in fuzzy near-field spaces (CN-F-NS)", IJMA, ISSN. 2229 – 5046, Vol.4, No.10, Pg. 1 – 12, 2013.
51. N V Nagendram, Dr T V Pradeep Kumar and Dr Y Venkateswara Reddy, " Fuzzy Bi-Γ ideals in Γ semi near – field spaces (F Bi-Gamma I G)" published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.4, No.11, Pg. 1 – 11, 2013.
52. N V Nagendram," EIFP Near-fields extension of near-rings and regular delta near-rings (EIFP-NF-E-NR) "published by International Journal of Mathematical Archive, IJMA, ISSN. 2229 - 5046, Vol.4, No.8, Pg. 1 –11, 2013.
53. N V Nagendram, E Sudeeshna Susila, "Generalization of (∈,∈Vqk) fuzzy sub near-fields and ideals of near-fields(GF-NF-IO-NF)", IJMA, ISSN.2229-5046, Vol.4, No.7,Pg. 1 – 11, 2013.
54. N V Nagendram, Dr T V Pradeep Kumar, "A note on Levitzki radical of near-fields (LR-NF)", Published by International Journal of Mathematical Archive, IJMA,ISSN. 2229-5046, Vol.4, No.4, Pg.288 – 295, 2013.
55. N V Nagendram, "Amalgamated duplications of some special near-fields (AD-SP-N-F)", Published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.4, No.2, Pg.1 – 7, 2013.
56. N V Nagendram," Infinite sub near-fields of infinite near-fields and near-left almost near-fields (IS-NF-INF-NL-A-NF)", Published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.4, No.2, Pg. 90 – 99, 2013.
57. N V Nagendram "Tensor product of a near-field space and sub near-field space over a near-field" published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.8, No.6, Pg. 8 – 14, 2017.
58. N V Nagendram, E Sudeeshna Susila, Dr T V Pradeep Kumar "Some problems and applications of ordinary differential equations to Hilbert Spaces in Engg mathematics (SP-O-DE-HS-EM)", IJMA, ISSN.2229-5046, Vol.4, No.4,Pg. 118 – 125, 2013.
59. N V Nagendram, Dr T V Pradeep Kumar and D Venkateswarlu, "Completeness of near-field spaces over near-fields (VNFS-O-NF)" published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.5, No.2, Pg. 65 – 74, 2014
60. Dr N V Nagendram "A note on Divided near-field spaces and ϕ-pseudo – valuation near-field spaces over regular δ-near-rings (DNF-ϕ-PVNFS-O-δ-NR)" published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.6, No.4, Pg. 31 – 38, 2015.
61. Dr. N V Nagendram "A Note on B_1-Near-fields over R-delta-NR(B_1-NFS-R-δ-NR)", Published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.6, No.8, Pg. 144 – 151, 2015.
62. Dr. N V Nagendram " A Note on TL-ideal of Near-fields over R-delta-NR(TL-I-NFS-R-δ-NR)", Published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.6, No.8, Pg. 51 – 65, 2015.
63. Dr. N V Nagendram "A Note on structure of periodic Near-fields and near-field spaces (ANS-P-NF-NFS)", Published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.7, No.4, Pg. 1 – 7, 2016.
64. Dr. N V Nagendram "Certain Near-field spaces are Near-fields(C-NFS-NF)", Published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.7, No.4, Pg. 1 – 7, 2016.
65. Dr. N V Nagendram "Sum of Annihilators Near-field spaces over Near-rings is Annihilator Near-field space (SA-NFS-O-A-NFS)", Published by International Journal of Mathematical Archive, IJMA, ISSN. 2229-5046, Vol.7, No.1, Pg. 125 – 136, 2016.
66. Dr. N V Nagendram "A note on commutativity of periodic near-field spaces", Published by IJMA, ISSN. 2229 - 5046, Vol.7, No. 6, Pg. 27 – 33, 2016.
67. Dr N V Nagendram "Densely Co-Hopfian sub near-field spaces over a near-field, IMA, ISSN No.2229-5046, 2016, Vol.7, No.10, Pg 1-12.
68. Dr N V Nagendram, "Closed (or open) sub near-field spaces of commutative near-field space over a near-field", 2016, Vol.7, No, 9, ISSN NO.2229 – 5046, Pg No.57 – 72.

69. Dr N V Nagendram, "Homomorphism of near-field spaces over a near-field "IJMA Jan 2017, Vol.8, No, 2, ISSN NO.2229 – 5046, Pg No. 141 – 146.
70. Dr N V Nagendram, "Sigma – toe derivations of near-field spaces over a near-field "IJMA Jan 2017, Vol.8, No, 4, ISSN NO.2229 – 5046, Pg No. 1 – 8.
71. Dr N V Nagendram, "On the hyper center of near-field spaces over a near-field "IJMA Feb 2017, Vol.8, No, 2, ISSN NO.2229 – 5046, Pg No. 113 – 119.
72. Dr N V Nagendram, "Commutative Theorem on near-field space and sub near-field space over a near-field "IJMA July, 2017, Vol.8, No, 7, ISSN NO.2229 – 5046, Pg No. 1 – 7.
73. Dr N V Nagendram, "Project on near-field spaces with sub near-field space over a near-field", IJMA Oct, 2017, Vol.8, No, 11, ISSN NO.2229 – 5046, Pg No. 7 – 15.
74. Dr N V Nagendram, "Abstract near-field spaces with sub near-field space over a near-field of Algebraic in Statistics", IJMA Nov, 2017, Vol.8, No, 12, ISSN NO.2229 – 5046, Pg No. 13 – 22.
75. Smt. T Madhavi Latha, Dr T V Pradeep Kumar and Dr N V Nagendram, "Commutative Prime Γ-near-field spaces with permuting Tri-derivations over near-field " ,IJMA Dec, 2017, Vol.8, No,12, ISSN NO.2229 – 5046, Pg No. 1 – 9.
76. Smt. T Madhavi Latha, Dr T V Pradeep Kumar and Dr N V Nagendram, "Fuzzy sub near-field spaces in Γ-near-field space over a near-field", IJMA Nov, 2017, Vol.8, No, 12, ISSN NO.2229 – 5046, Pg No.188 – 196.
77. Smt. T Madhavi Latha, Dr T V Pradeep Kumar and Dr N V Nagendram, "Gamma Semi Sub near-field spaces in gamma near-field space over a near-field PART I", IJMA Jan, 2018, Vol. 9, No, 2, ISSN NO.2229 – 5046, Pg No.135 – 145.
78. Smt. T Madhavi Latha, Dr T V Pradeep Kumar and Dr N V Nagendram, "Gamma Semi Sub near-field spaces in gamma near-field space over a near-field PART II", IJMA 14 Feb, 2018, Vol. 9, No, 3, ISSN NO.2229 – 5046, Pg No.6 – 12.
79. Smt. T Madhavi Latha, Dr T V Pradeep Kumar and Dr N V Nagendram, "Gamma Semi Sub near-field spaces in gamma near-field space over a near-field PART III", IJMA 26 Feb, 2018, Vol. 9, No, 3, ISSN NO.2229 – 5046, Pg No.86 – 95.
80. Smt. T Madhavi Latha, Dr T V Pradeep Kumar and Dr N V Nagendram, "Gamma Semi Sub near-field spaces in gamma near-field space over a near-field PART IV", IJMA 09 Mar, 2018, Vol. 9, No, 4, ISSN NO.2229 – 5046, Pg No.1 – 14.
81. Dr N V Nagendram, "Nagendram Gamma-Semi Sub near-field spaces in gamma near-field space over a near-field", IJMA 29 April, 2018, Vol. xx, No, xx, ISSN NO.2229 – 5046, Pg No.xxx – xxx.
82. Dr N V Nagendram, "Topological Nagendram Gamma-Semi Sub near-field spaces in gamma near-field space over a near-field ", IJMA 29 May, 2018, Vol. 9, No, 7, ISSN NO.2229 – 5046, Pg No.7 – 18.
83. Dr N V Nagendram, "Deformation Retracts of classical Nagendram Gamma-semi sub near-field spaces of a Gamma-near-field space over near-field" August, 2018, Vol. xx, No, xx, ISSN NO.2229 – 5046, Pg No.xxx – xxx.

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