International Journal of Mathematical Archive-7(4), 2016, 20-26
Available online through www.ijma.info ISSN 2229 – 5046

A NOTE ON STRUCTURE OF PERIODIC NEAR-FIELDS AND NEAR-FIELD SPACES (ANS - PNF - NFS)

Dr. N. V. NAGENDRAM*

**Professor of Mathematics,
Kakinada Institute of Technology & Science,
Department of Science & Humanities (Mathematics),
Tirupathi (v), Divili 533 433, East Godavari District, Andhra Pradesh, INDIA.**

(Received On: 11-03-16; Revised & Accepted On: 13-04-16)

ABSTRACT

The aim of this work is to study a decomposition theorem for near-field spaces satisfying either of the properties $xy = x^p f(xyx)x^q$ or $xy = x^p f(yxy)x^q$, where $p = p(x, y)$, $q = q(x, y)$ are non-negative integers and $f(t) \in tZ(t)$ vary with the pair of elements x, y and further investigate the commutativity of such near-fields. Other related results are obtained for near-fields spaces.

Key words: *Near-ring, Near-field, periodic Near-field, sub Near-field, sub Near-field space, ideal, distributively generated near-field space, f-near-field space, nil near-field space, zero commutativity.*

2000 Mathematics Subject Classification: *43A10, 46B28, 46H25, 46H99, 46L10, 46M20,16Y30,16U80.*

SECTION-1: INTRODUCTION

Dr. N V Nagendram [10] established the commutativity of near-field spaces over near-fields in which all products two elements are potent. In recent trends using this result Leigh proved that such near-field spaces are direct sum of J-near-field spaces i.e., near-field spaces satisfying Jacobson's property $x^{n(x)} = x$ property and zero near-field spaces. More recently author studied the direct sum decomposition of near-field spaces satisfying the property $xy = (xy)^2 f(x, y)$ where $f(X, Y) \in Z(X, Y)$, the near-field space of polynomials in two non-commuting in determinates. Now we consider the following near-field space properties.

(B) $\forall$ x, y in a near-field space N, there exist integers $p = p(x, y) \geq 0$, $q = q(x, y) \geq 0$ and a polynomial $f(t) \in t\,Z(t)$ such that

$$xy = x^p f(xyx)x^q \tag{1.1}$$

(B_1) $\forall$ x, y in a near-field space N, there exist integers $p = p(x, y) \geq 0$, $q = q(x, y) \geq 0$ and a polynomial $f(t) \in t\,Z(t)$ such that

$$xy = x^p f(yxy)x^q \tag{1.2}$$

SECTION-2: A DECOMPOSITION THEOREM FOR NEAR-FIELD SPACES

In this section, I establish a decomposition theorem which in turn allows us to study the commutativity of such near-field spaces. Throughout this section, N represents an associative near-field may be without unity 1 and C = N(N), the set of nilpotent elements of N.

Definition 2.1: A near-field space is called periodic near-field space if for each $x \in N$ there exist distinct positive integers $m = m(x)$, $n = n(x)$ such that $x^m = x^n$.

Definition 2.2: A near-field space N is called zero commutative near-field space if xy =0 implies that yx =0 for all $x, y \in N$.

*Corresponding Author: Dr. N. V. Nagendram**
Professor of Mathematics, Kakinada Institute of Technology & Science,
Department of Science & Humanities (Mathematics), Tirupathi (v), Divili - 533 433,
East Godavari District, Andhra Pradesh, INDIA.

Definition 2.3: An element x of N satisfying the property $x^{n(x)} = x$ for some n(x) > 1 is called potent.

Let B be the set of all potent elements, If B = N, then N is a J-near-field space. By a well known theorem of Jacobson, J-near-field spaces are necessarily commutative near-field spaces. A sufficient condition for N to be periodic near-field space for each $x \in N$ there exists an integer p = p(x) > 1 and a polynomial $f(t) \in Z(t)$ such that $x^p = x^{p+1}f(x)$. If N is periodic near-field space then every element $x \in N$ can be written in the form x = b + c, where b, $c \in C$. Further if in a periodic near-field space N, each element has a unique representation as above, then both B and C are sub near-field spaces and $N = B \oplus C$. By these two we obtain a decomposition theorem for near-field spaces satisfying one of the properties (B) and (B_1). In fact, I establish the following result:

Theorem 2.4: Let N be a near-field space satisfying one of the properties (B) and (B_1). Then N is a direct sum of a J-near-field space and a null near-field space.

Proof: We prove this theorem into the following parts called steps.

Step-1: Let N be a near-field space satisfying (B). Then N is periodic near-field.

Proof: Let y = x in (B). This shows that N satisfies criterion for periodicity and hence the near-field space satisfying (B) is necessarily periodic near-field.

Step-2: Let N be the near-field space satisfying (B). Then N is zero commutative near-field.

Proof: Let xy = 0. Then there exist integers $p' = p(x, y) \geq 0$, $q' = q(x, y) \geq 0$ and a polynomial $h(t) \in t\,Z(t)$ such that $yx = y^{p'}h(xyx)y^{q'} = 0$. This implies that N is zero commutative near-field.

Step-3: Let N be a near-field space satisfying (B), Then NC = CN = (0).

Proof: let r(x) = 2. Replacing y by x in (B), we get $x^2 = x^r g(x)$, for some $g(t) \in tZ(t)$ and by step 1, N is periodic near-field. Clearly N is nil near-field.

Now we have

$$x^2 = x^r g(x) \text{ for } g(t)\ Z(t), \quad r(x) \geq 2 \tag{2.1}$$

Let $c \in C$ and $x \in N$. Then choose integers $p_1 = p(c, x) \geq 0$, $q_1 = q(c, x) \geq 0$ and a polynomial $f_1(t) \in tZ(t)$ such that

$$cx = c^{p_1} f_1(cxc) c^{q_1} \tag{2.2}$$

From the equality (2.1) one can easily observe that $c^2 = 0$and hence $0 = xc^2 = (xc)c$. Step 2 gives that c(xc) =0 which together with (2.2) yields that cx = 0 and again step 2 gives that xc = 0 for all $x \in N$, $c \in C$. Thus gives the required result

i.e., $$NC = CN = (0) \tag{2.3}$$

By Step 1, N is periodic near-field space so that each element $x \in N$ can be written in the form b + c, where $b \in B$ and $c \in C$. By a nice result it is enough to show that this representation is unique. If a + c = b + d for some a, $b \in B$ and c, $d \in C$ then

$$a – b = d – c \tag{2.4}$$

Let a, $b \in B$. Then there exist at least one odd of the positive integers r = r(a) and s = s(b) such that $a^r = a$ and $b^s = b$.

Let k = (r – 1) s – (r – 2) = (s -1)r – (s – 2) be an odd positive integer. Thus it is clear that $a^k = a$ and $b^k = b$. Also $e_1 = a^{k-1}$, $e_2 = b^{k-1}$ are idempotents in N with $e_1a = a$ and $e_2b = b$. Multiplying (2.4) by a and b from both sides using the result of step 3, we get $a^2 = ab = ba$. This gives that $a^2 = b^2$ and hence $e_1 = e_2$.

If k is even and $a^k = a$, then $a^{2(k-1)+1} = a$, where 2(k – 1) + 1 is odd, so this yields the required result.

Left multiplying (2.4) by e_1 now yields a = b and this completes the proof of the theorem.

Similar arguments can be used if N satisfies the property (B_1).

Remark 2.5: By the result of step 2, one concludes that the nilpotent elements of N annihilates N on both sides and hence are central near-fields. However, J-near-field spaces are commutative near-fields so that theorem 2.4 at once gives the following corollary which extends the main result.

© 2016, IJMA. All Rights Reserved

Corollary 2.6: Let N be a near-field space satisfying any one of the following properties (B) (B_1). Then N is commutative near-field.

SECTION-3: DECOMPOSITION THEOREMS FOR NEAR-FIELD SPACES

In this section, I investigate the structure of near-field spaces satisfying the properties (B) and (B_1). Here, N denotes a left near-field space and Z = Z(N) the multiplicative center of N.

Definition 3.1: An element x of N is called distributive if $(a + b)x = ax + bx$ for all $a, b \in N$ are distributive, then N is called a distributive near-field space.

Definition 3.2: A near-field space N is called a periodic near-field space if for each $x \in N$ there exist distinct positive integers m = m(x) and n = n(x) such that $x^m = x^{n.}$

Definition 3.3: A near-field space N is called a zero-symmetric if $0x = 0$ for all $x \in N$ (or left distributivity yields $x0 = 0$).

Definition 3.4: A sub near-field space of a near-field space N is a normal sub near-field space M of (N, +) such that (i) $NM \subseteq M$ and (ii) $(x + \alpha)y – xy \in M$ for all $x, y \in N$ and $\alpha \in M$.

Note 3.5: One can not get the direct sum decomposition under the hypothesis of the theorem 2.4 even in the case of distributive near-field spaces.

Definition 3.6: Week orthogonal sum of near-field space. A near-field space N is an orthogonal sum of sub near-field spaces P and Q denoted by N = P + iQ, if PQ = QP = (0) and each element of N has a unique representation of the form $p + q$, $p \in P$, $q \in Q$.

Now, Dr N V Nagendram's aim is to establish the decomposition theorems for near-field spaces satisfying any one of the following related properties:

(B_2) $\forall$ x, y in a near-field space N, $\exists$ integers p = p(x, y) there exist integers p = p(x, y) ≥ 0, q = q(x, y) ≥ 0 and

$$r = r(x, y) \geq 1 \ni xy = x^p (xyx)^r x^q \quad (3.1)$$

(B_3) $\forall$ x, y in a near-field space N, $\exists$ integers p = p(x, y) ≥ 0, q = q(x, y) ≥ 0 and r = r(x, y) ≥ 1 such that

$$xy = x^p (yxy)^r x^q \quad (3.2)$$

Lemma 3.7: Let N be a zero commutative near-field space. Then the set C of all nil potent elements is a sub near-field space if and only if C is a sub near-field space of the additive sub near-field space (N, +).

Lemma 3.8: Let N be a periodic near-field space with multiplicative identity. If $C \subseteq Z$, then (N, +) is abelian.

Lemma 3.9: Let N be a near-field space in which the idempotents are multiplicatively central near-field space. If e_1 and e_2 are idempotents, then there exists an idempotent e_3 such that $e_3e_1 = e_1$ and $e_3e_2 = e_2$.

Theorem 3.10: Let N be a near-field space satisfying the property (B_2). If the idempotents of N are multiplicatively central near-field space, then M is a sub near-field space with (M, +) abelian and C is a sub near-field space with trivial multiplication and $N = C \perp M$.

Proof: We prove this theorem with the following existing known lemma 3.7, 3.8 and 3.9.

Clearly we see that a near-field space satisfying (B_2) is necessarily ero symmetric as well as zero commutative near-field space. Let $c \in C$ and x be an arbitrary element of N. then there exist integers p = p(x, c) ≥ 0, q = q(x, y) ≥ 0 and r = r(x, y) ≥ 1 such that $xy = x^p (yxy)^r x^q$ (3.3)

Next choose integers $p' = p(x) \geq 0$, $q' = q(x) \geq 0$ and $r' = r(x) \geq 1$ such that $x^2 = x^{p' + q' + 3r'}$. (3.4)

Since (3.4) gives that $c^2 = (0)$ for any $c \in C$, we obtain that $c(cx) = c^2x = 0$ and the zero commutativity in N yields that $(cx)c = 0$. Thus by using lemma 3.8 we find that $xc = 0$ for all $x \in N$, and also ero commutativity near-field space of N implies that $cx = 0$ i.e., NC = CN = (0) (3.5)

(3.5) shows that all nil potent elements of N annihilates N on both sides and hence, In particular, $C^2 = (0)$ and $C \subseteq Z$. If $c, d \in C$, then $(c – d)^2 = 0$. This gives that $c – d \in C$ and C is a sub near-field space of the additive sub near-field space (N, +). Now the application of lemma 3.7 yields the required result. This completed the proof of the theorem.

© 2016, IJMA. All Rights Reserved

Lemma 3.11: Let N be a near-field space satisfying the property (B_2). If the idempotents of a near-field space N are multiplicatively central near-field space, then M is a sub near-field space with (M, +) abelian.

Proof: Let a, b $\in$ M. Then there exist integers $m' = m(a) > 1$ and $n' = n(b) > 1$ such that $a^{m'} = a$ and $b^{n'} = b$.

If $$s = (m' - 1)n' - (m' - 2) = (n' - 1) m' - (n' - 2) > 1 \quad (3.6)$$

Then it clear that $a^s = a$ and $b^s = b$. Note also that $e_1 = a^{s-1}$ and $e_2 = b^{s-1}$ are central idempotents in N with $e_1a = a$ and $e_2b = b$. Also in view of (B_2) we find that

$$ab = (e_1a)(e_2b) = (e_1e_2)(ab) = (e_1e_2)^p(e_1e_2abe_1e_2)^p(e_1e_2)^q \quad (3.7)$$

For some integers $p = p(e_1e_2ab) \geq 0$, $q = q(e_1e_2ab) \geq 0$ and $r = r(e_1e_2ab) > 1$.

This yields that $ab = (e_1e_2)\,(ab)^r\,(e_1e_2)$. (3.8)

So ab $\in$ M. moreover, since N/C has the $x^m = x$ property, we have an integer k > 1 such that

$$(a - b)^k = a - b + c. \quad (3.9)$$

Where a, b $\in$ M and c $\in$ C. Now e_1 and e_2 are central idempotents in N and, in view of lemma 3.9 there exists an idempotent e $\in$ N such that $ee_1 = e_1$ and $ee_2 = e_2$. This implies that ea = a and eb = b. Since (3.5) is still valid in the present situation, multiply (3.9) by e to get $(a - b)^k = a - b$, and hence a – b $\in$ M. Also, eN is a periodic near-field space with multiplicative identity element in which nilpotent elements are multiplicatively central near-field space. Thus by lemma 3.8, (eN, +) is abelian. Therefore, ea + eb = eb + ea, i.e., a + b = b + a, and hence (M, +) is abelian.

Now we look into Proof of theorem 3.10. Let x $\in$ N. Then in view of (3.4), if $x^2 = x^k$, $k = p^r + q^s + 3r' \geq 3$, then clearly $x^j = x^{j + s(k-2)}$ for all $j \geq 2$ and $s \geq 1$. It follows at once that $(x^{k-1})^{k-1} = x^{k-1}$, $x^{k-1} \in$ M. It follows that $(x - x^{k-1})^2 = 0$ and $x - x^{k-1} \in$ C. Hence, we can write $x = x - x^{k-1} + x^{k-1}$ and see that N = C + M. Now in view of lemma 3.10 and lemma 3.11, it remains only to show that each element of N has the unique representation in the form c + b, where c $\in$ C, b $\in$ M. Suppose that c + a = d + b, where c, d $\in$ C and a, b $\in$ M. Then – d + c = b – a $\in C \cap M = (0)$. This gives that a = b and c = d. This completes the proof of the theorem.

Note 3.12: It is obvious that centrality of idempotents in the hypothesis of theorem 3.10 is not superfluous.

Note 3.13: If a near-field space N satisfies (B_3) then it can be easily verified that N need not be zero commutative near-field space. However a zero symmetric near-field space satisfying (B_3) is necessarily zero commutative near-field space. Hence for a zero symmetric near-field space satisfying (B_3) lemma 3.10 and lemma 3.11 may be proved easily in the same fashion. By using similar arguments used to prove theorem 3.11, with necessary variations, we can prove the following result. We omit the details of the proof to avoid repetition.

Theorem 3.14: Let N be a ero symmetric near-field space satisfying (B_3). If the idempotent elements of N are multiplicatively central near-field space, then C is a sub near-field space with trivial multiplication, M is a sub near-field space with (M, +) abelian and N = C + M.

REFERENCES

1. A. Badawi, D.F. Anderson and D.E. Dobbs, Pseudo-valuation rings, Lecture notes on Pure Appl. Math, Vol. 185(1997), pp 57-67, Marcel Dekker, New York/Basel.
2. A. Badawi, On domains which have prime ideals that are linearly ordered, comm. Algebra, Vol. 23(1995), pp no.4365-4373.
3. A. Badawi, On divided commutative rings, comm.. Algebra., vol. 27(1999), pp. 1465-1474.
4. A. Badawi, On ϕ-pseudo valuation rings, Lecture notes Pure Appl. Math. Vol.205 (1999), pp.101–110, Marcel Dekker, New York/Basel.
5. A. Badawi, On ϕ-pseudo valuation rings II, to appear in Houston J Math.
6. A. Badawi, Algebraic On ϕ-chained rings, and ϕ-pseudo valuation rings to appear in Houston J Math..
7. A Badawi, Remarks on ϕ-pseudo valuation rings comm. Algebra. vol. 28(2000), pp. 2343-2358.
8. A. Badawi, On chained overrings of pseudo valuation rings, *Commun. Algebra* 28(2000), pp.2359-2366.
9. Gunter Pilz, Near-rings the theory and its applications, 2nd ed, North Holland mathematics studies, no.23, pp.Xv+470, north Holland publishing Co., Amsterdam, New York, Oxford, 1983. MR 85th 16046, Zbi 521 16028.
10. S Leigh and J Luh Direct sum of J-rings and zero rings. Amr. Math. Monthly 96 (1989) n0.1, 40 – 41, MR 90a:16021, Zbi 671.16015.

11. 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.
12. 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.
13. 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.
14. 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.
15. 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.
16. 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.
17. 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.
18. 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.
19. 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.
20. 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.
21. 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.
22. 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.
23. 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).
24. 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.
25. 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).
26. 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.
27. N. V. Nagendram, S. Venu Madava Sarma and T. V. Pradeep Kumar, “A NOTE ON SUFFICIENT CONDITION OF HAMILTONIAN PATH TO COMPLETE GRPHS (SC-HPCG)”, IJMA-2(11), 2011, pp.1-6.
28. 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.
29. 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, @Research India Publications, Advances in Algebra ISSN 0973-6964 Volume 4, Number 1 (2011), pp.51-55© Research India Publicationspp.51-55
30. 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.

© 2016, IJMA. All Rights Reserved

31. 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
32. 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.
33. 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.
34. 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 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.
35. 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 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.
36. 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.
37. 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.
38. 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.
39. N V Nagendram, S V M Sarma, Dr T V Pradeep Kumar "A note on Relations between Barnette and Sparse Graphs" published in an International Journal of Mathematical Archive (IJMA), An International Peer Review Journal for Mathematical, Science & Computing Professionals, 2(12),2011,pgno2538-2542, ISSN2229 – 5046.
40. 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.
41. 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.
42. 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.
43. N V Nagendram, 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.
44. Dr N V Nagendram, Professor, Kakinada Institute of Technology (KITS), Divili, Dr T V Pradeep Kumar "Characterisation of near-field spaces over Baer-ideals" IV International Conference at Thailand 19 – 20 th Dec 2015 by IJMSA.
45. Dr N V Nagendram, Professor of Mathematics, Kakinada Institute of Technology(KITS), Divili "A note on TL-Ideal of near-field spaces over regular delta near-rings" published by IJMA, Vol.No.6, No.8, pp. 51 - 65, 2015.
46. Dr N V Nagendram, Professor of Mathematics, Kakinada Institute of Technology(KITS), Divili "A note on B_1 -near-field spaces over regular delta near-rings" published by IJMA, Vol. 6, No.8, pp. No.144 -151, 2015.
47. Dr N V Nagendram, Professor of Mathematics, Kakinada Institute of Technology(KITS), Divili, Dr T V Pradeep Kumar "Amenability for dual concrete complete near-field spaces over regular delta near -rings" published by IJMSA, Vol. No. pp. No. 2014.
48. Dr N V Nagendram, Professor of Mathematics, Kakinada Institute of Technology (KITS), Divili , Dr T V Pradeep Kumar, Dr D Venkateswarlu "Completeness of near-field spaces over near-fields" published by IJMA, 2014, Vol. No.5, ISBN. 2229 – 5046, No. 2, pp. 65 - 74.
49. Dr N V Nagendram, Professor of Mathematics, Kakinada Institute of Technology(KITS), Divili, "A Note on Divided near-field spaces and phi- pseudo valuation near-field spaces over regular delta near rings" published by IJMA, 2015, Vol. No.6, ISBN. 2229 – 5046, No. 4, pp. 31 - 38.
50. Dr N V Nagendram, Professor of Mathematics, Kakinada Institute of Technology (KITS), Divili, A Text Book "Algebraic topology over near-fields & Semi-simple near-fields and its Applications" published by Research India Publications, New Delhi ISBN: 978-93-84443-62-7, 2015.

51. Dr N V Nagendram, Professor of Mathematics, Kakinada Institute of Technology (KITS), Divili, Advanced research article "Sum of annihilator near-field spaces over near-ring is Annihilator near-field space (SA – NFS – ONR – A NFS) "published by IJMA, ISSN No. 2229 – 5046, Vol. No.7, No.1, 2016, pp No.125 – 136.

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

[Copy right © 2016. This is an Open Access article distributed under the terms of the International Journal of Mathematical Archive (IJMA), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.]