21st International Conference on Near-rings, Near-fields and related topics Abbey Vorau (Styria, Austria)

July 26 – August 1^{st}, 2009

Organizer R. Mlitz (TU Wien)

Invited speakers:

Gary Birkenmeier, Lafayette, USA
Nico Groenewald, Port Elizabeth, South Africa
László Márki, Budapest, Hungary
Stuart Scott, Auckland, New Zealand
Stefan Veldsman, Muscat, Oman
Robert Wisbauer, Düsseldorf, Germany

Preface

Dear participants,

welcome to Austria once more, welcome to Vorau ! I hope you will enjoy the place. As at the last conference, besides the nearring-"kernel", there will be some survey talks from other areas of algebra; hopefully they will give new impacts on nearring research.

Besides the scientific program we try to show to you as much as possible from the nice area in this part of Styria.

Last not least I want to express my gratitude to the supporters of this conference:

- Bundesministerium für Wissenschaft und Forschung
- Amt der Steiermärkischen Landesregierung
- Deloitte Consulting Comp.
- Wiener Städtische Versicherung

and to those who helped me organising the conference and who will take care of you, in particular:

my wife Heidi and my daughter Veronika
my colleague Wolfgang Herfort
Erhard and Günter from Linz

I wish you a successful conference !

Rainer Mlitz

Program

Monday, July 27:

9.00	**Opening of the Conference:**
Chair:	**Gerhard Betsch**
9.15	**Stuart SCOTT:** Generation of $M_0(V)$ from a group theory perspective
10.30	Coffee break
Chair	**Nebojša Mudrinski**
10.50	**G.Alan CANNON:** Rings determined by cyclic covers of groups
11.20	**Wolfgang HERFORT:** Comments on periodic multiplicative groups of nearfields
12.30	Lunch
14.00	Guided tour through the abbey
15.40	Coffee break
Chair	**Carl Maxson**
16.00	**Franz BINDER:** Algorithmic nearring theory
16.30	**Wen-Fong KE:** The cardinality of some symmetric differences
17.00	**Günter PILZ:** Nearrings in agriculture

Tuesday, July 28:

Chair	**Erhard Aichinger**
8.45	**László MÁRKI:** Semiabelian categories
10.00	**Maja PECH:** Local Methods for Rosenberg relations
10.30	Coffee break
Chair	**Jawad Abuhlail**
10.50	**Tim BOYKETT:** Seminearrings of polynomials and order preserving functions on lattices
11.20	**Karin-Therese HOWELL:** Maximal endomorphism semirings
12.30	Lunch
14.00	Visit to the open air museum near the abbey
15.40	Coffee break
Chair	**Christian Pech**
16.00	**Robert WISBAUER:** Modules, comodules and contramodules
17.15	**Jawad ABUHLAIL:** Monads and comonads in categories of semimodules over semirings

Wednesday, July 29:

Chair	**Wen-Fong Ke**
8.45	**Nico GROENEWALD:** The notion of prime in nearrings
10.00	**Suresh JUGLAL:** Primeness in the generalized group near-ring
10.30	Coffee break
Chair	**Karin-Therese Howell**
10.50	**Geoff BOOTH:** The strongly prime radical in nearrings of continuous functions
11.20	**Rainer MLITZ:** On radicals defined by prime ideals
12.30	Lunch
13.30	**Excursion** Departure by bus to Alpl – visit of the Waldschule (school in the woods) and the house where the poet Peter Rosegger was born. Possibility to walk from there to St.Kathrein (approx. 2 hours). By bus to the "Bratlalm" – dinner. Back at the abbey about 22:00

Thursday, July 30

Chair	**Hermann Kautschitsch**
8.45	**Stefan VELDSMAN:** Polynomial nearrings
10.00	**Peter MAYR:** Nearrings of polynomial functions on expanded groups
10.30	Coffee break
Chair	**Geoff Booth**
10.50	**Erhard AICHINGER:** An instance of the subnearring membership problem
11.20	**Gerhard WENDT:** Minimal left ideals in nearrings
12.30	Lunch
Chair	**Günter Pilz**
14.00	**Johan MEYER:** On an open question regarding 0-primitivity and matrix nearrings
14.30	**Nebojša MUDRINSKI:** Higher commutators and multilinear expanded groups
15.00	**Carl MAXSON:** Maximal subnearrings of functions
15.40	Coffee break
16.00	**Problem session**
17.00	**Business meeting**

Friday, July 31

Chair	**Gerhard Wendt**
8.45	**Gary BIRKENMEIER:** E(G,K) and related nearrings
11.20	**Gary PETERSON:** Compatible extensions of nearrings
11.50	**Closing of the Conference**
10.30	Coffee break

20.00 Evening: For the interested participants, a colleague coming from Vorau proposes a concert of classical music given by a guest family trio from Byelorus.

Additional excursions for accompanying persons

Tuesday, july 28:

09:15 Excursion to the Festenburg Castle

Thursday, july 30:

14:30 Excursion to the pilgrim's church Pöllauberg (panoramic view)

Abstracts

Monads and Comonads of Semimodules

Jawad Abuhlail, Box 5046, KFUPM, KSA

In this talk we consider the monoidal category of semimodules over a semiring with the Katsov tensor product. We introduce and study the notions of semialgebras and semicoalgebras in such categories. We also investigate several monads and comonads of semimodules and study the associated categories of modules and comodules. The possibility of introducing analogous monads and comonads in categories of nearmodules over a nearring will be considered.

An instance of the subnear-ring membership problem

Erhard Aichinger, Linz

We characterize the integral polynomials that can be obtained from 1, x, and x^2 by using $+$, $-$, and functional composition. In particular, let N be the subnear-ring of $(Z[x], +, \circ)$ that is generated by 1, x, and x^2. Then $x^8 = x^2 \circ (x^2 \circ x^2)$ and $2x^5 = -x^2 - (x^2 \circ x^2 \circ x^2) + (x^2 \circ (x + x^2 \circ x^2))$ lie in N. However, x^5 does not lie in N. We characterize the elements of N and obtain a similar charactarization for the near-ring generated by $\{1, x, x^3\}$.

AMS classification 16Y30.

Algorithmic Near-ring theory

Franz Binder, Linz

For a group G, we try to computationally find out the structure of finitely generated transformations nearrings on G, i.e., with a subnearring R of $M(G)$ which is generated by some finite set E of transformations. It is supposed that mastering these nearrings algorithmically should have a similar impact on computational nearring theory as the ability to efficiently compute with permutation groups had on computational group theory.

In particular, if G is finite, it is important to do computations by just using the generators and, maybe, an enumeration of G, but avoiding to enumerate the elements of R itself, because this may be practically impossible even for groups of rather small order like $|G| > 10$.

One approach is to try to transform the set of nearring generators E into a set of additive generators. This way, well-established algorithms for groups can be used subsequently. This is possible in many important situations, including d.g. nearrings and generalizations thereof, but not always. In addition, this appoach will never help to deal with nearrings whose additive group is to big for being mastered by general methods for groups.

The other approach is to develop algorithms that use the nearring generators more directly. Rather easily we see that we can master any R-module V quite well, as long as V can be enumerated, e.g., $V = G$ (with the obvious action), and also $V = G^2$, but not the additive group of R considered as an R-module. The tricky part is to transform this information back to R itself. To do the same with infinite groups, we will need appropriate chain conditions as well as some kind of smoothness of the generators. In the talk, I will try to give some survey on achievements and open problems in this area.

$E(G, K)$ and related nearrings

Gary Birkenmeier, Louisiana

In this talk, we will discuss the history of various Transformation Nearrings and focus on subnearrings of $E(G)$ determined by a subgroup K of a group G. For example, we will consider

$$E(G, K) := \{f \in E(G) \mid f(G) < K\}$$

and the subgroup of $E(G)$ generated by $\{h \in End(G) \mid h(K) < K\}$. Conditions for some of these nearrings to be rings will be provided and some new directions will be indicated. Examples to illustrate and delimit the theory will be presented.

The Strongly Prime Radical in Near-rings of Continuous Functions

Geoff Booth, Port Elizabeth

Let G be a T_0 (and hence completely) regular additive topological group. The set $N_0(G)$ of all zero-preserving continuous self-maps of G is a zero-symmetric near-ring with respect to pointwise addition and composition of functions. In general, $N_0(G)$ need not be simple, unlike the case for the set $M_0(G)$ of all zero-preserving self-maps of G. For example, $P_G := \{a \in N_0(G) : a(U) = 0$ for some open subset U of G such that $0 \in U\}$ is an ideal of $N_0(G)$ which is frequently non-trivial. In this talk we consider the *strongly prime radical* $\mathcal{P}_s$.

Theorem 1 $\mathcal{P}_s(N_0(\mathbf{R}^n)) = P_{\mathbf{R}^n}$ *for all* $n \in \mathbf{N}$.

The proof of Theorem 1 makes use of the Peano *space-filling curves.*

Let X be a topological space, and let $\theta : G \to X$ be a continuous mapping. The set $N_0(G, X, \theta) := \{a : X \to G : a$ is continuous and $a\theta(0) = 0\}$ is a zero-symmetric near-ring with pointwise addition and multiplication defined by $a{\cdot}b := a\theta b$. $N_0(G, X, \theta)$ is called a *sandwich near-ring.* We consider the strongly prime radical for sandwich near-rings by introducing a *generalised space-filling curve, inter alia.*

Theorem 2 *Let* X *be a topological space and let* $\theta : \mathbf{R}^n \to X$ *be a continuous mapping such that (1)* θ *is left invertible and (2) if* U *is an open subset of* $\mathbf{R}^n$ *which contains* 0*, then* $\theta(U)$ *contains an open subset* V *of* X *which contains* $\theta(0)$*. Then* $\mathcal{P}_s(\mathbf{R}^n, X, \theta) = \mathcal{P}_u(\mathbf{R}^n, X, \theta) = P_{(\mathbf{R}^n, X, \theta)}$*, where* $P_{(G,X,\theta)} := \{a \in N_0(G, X, \theta) : a(U) = 0$ *for some open set* U *of* X *which contains* $\theta(0)\}$.

Seminearrings of polynomials and order preserving functions on lattices

Tim Boykett, Linz

The collection of polynomials on a lattice form a seminearring, as does the set of order-preserving functions from a lattice to itself. In this talk we will look at these two seminearrings, some of their properties, interrelations and ways that their representations relate to the representations of the underlying lattice.

Rings Determined by Cyclic Covers of Groups

G. Alan Cannon, Hammond, LA

For a finite group G and a cover C of G by cyclic subgroups, we investigate the structure of the associated ring R(C). General results are obtained which are then applied to obtain specific results on several classes of groups.

The notion of prime in nearrings

Nico Groenewald, Port Elizabeth ZA

The study of prime ideals for rings or semi-groups is facilitated by the equivalence of the two conditions on an ideal I of a ring (semigroup) R:

(a) If A and B are ideals of R such that $AB \subseteq I$, then $A \subseteq I$ or $B \subseteq I$;

(b) If $x, y \in R$ are such that $xRy \subseteq I$, then $x \in I$ or $y \in I$.

These conditions are not equivalent in the class of near-rings. For near-rings there are many non equivalent definitions of prime near-rings. In this talk we discuss the impact on research in near-rings of these different prime near-rings.

On periodic multiplicate group of a nearring

Wolfgang Herfort, Wien

E.Jabara and P.Mayr used a result of O.H. Kegel about groups without infinite abelian subgroups for deriving that every group in the title of exponent $2^m \cdot 9$ must be already finite. I shall discuss a variant of the proof of Kegel's result and comment on other conditions which allow to conclude that such groups must be finite.

Maximal Endomorphism Semirings*

Karin-Therese Howell, Stellenbosch

For a finite abelian group A, the ring $End(A)$ is a maximal ring in the near-ring $M(A)$. In this talk we consider an analogous problem for finite monoids. Specifically, if $M = \langle M, +, 0\rangle$ is an abelian monoid, then $End(M)$ is a semiring in the near-semiring $Map(M)$.

We discuss the problem of characterizing those finite M such that $End(M)$ is a maximal semiring in $Map(M)$.

* This is collaborative work with C.J. Maxson, Department of Mathematics, Texas A&M University, United States of America.

Primeness in the Generalized Group Near-ring

Suresh Juglal, Port Elizabeth ZA

In 1989, Le Riche, Meldrum and Van der Walt introduced the notion of a group near-ring, $R[G]$. Recently, Groenewald and Lee extended this idea to what they referred to as the generalized semigroup near-ring, denoted by R[S; M]. Here R is a zerosymmetric right near-ring with identity 1, S is a semigroup and M is any faithful left R-module.

In this talk, we define the generalized group near-ring, $R[G; M]$, following the definition provided by Groenewald and Lee but by choosing G to be a group rather than a semigroup. We then define two ideals of $R[G; M]$ constructed from an R-ideal in M, and investigate the prime relationships between these two ideals and the ideals of the base near-ring R and/or the underlying module M.

The Cardinality of Some Symmetric Differences

Wen Fong Ke, Tainan TW

In 1992, Fuchs and Pilz studied error correcting codes using compositions of polynomials. While Fuchs developed the general scheme, Pilz focused on the binary one. The minimal distances of the binary codes which Pilz studied remain undetermined. However, it was conjectured to be the same as the degree of the base polynomial of the code.

A special case of the conjecture, named the "1-2-3 Conjecture", says that the symmetric difference of the sets $\{1, 2, \ldots, k\}$, $\{2, 4, \ldots, 2k\}$, ..., $\{n, 2n, \ldots, kn\}$ has at least k elements for any positive integers k and n. a The 1-2-3 Conjecture was shown to be true for small k ($k < 9$), and large k ($k > 1012$). In this talk, we present a proof that the conjecture is indeed true for all k. This is a joint work with P.-Y. Huang and G. Pilz.

Semi-Abelian Categories

László Márki

In a seminal paper published in 1950, S. Mac Lane set the aim of developing a categorical treatment of groups, and began doing so in the more symmetrical abelian case. This has led to the theory of abelian categories, almost fully developed by the mid sixties. These categories cover, among others, abelian groups but not groups in general. It has become clear that the restriction to the abelian case is not a mere technical simplification. There have been attempts for a categorical treatment of certain aspects of groups and rings: isomorphism theorems, commutator theory, non-abelian homological algebra, radical theory, semidirect products, but without a clear common background for them. Semi-abelian categories, introduced in a work of Janelidze, Márki, and Tholen published in 2003, yield a framework for all these (and more) investigations in a setting which is valid e.g. in any variety of multioperator groups, achieving thereby the task set by Mac Lane in 1950.

The aim of the present talk is to give an introduction to this topic, which can be of interest for research in some aspects of near-ring theory as well.

Maximal subnearrings of functions

Carl Maxson, Texas

In this talk we characterise all maximal subnear-rings of $M(G)$ for any group G and show that for many classes of groups, $E(G)$ is never maximal as a subnear-ring of $M_0(G)$.

Near-rings of polynomial functions on expanded groups

Peter Mayr, Linz

Let p, q be (not necessarily distinct) primes. We describe all near-rings of functions on cyclic groups of size pq that contain the identity map and all constant maps.

On an open question regarding 0-primitivity and matrix near-rings

Johan H. Meyer, Bloemfontein

Whether the 0-primitivity of the $n \times n$ matrix near-ring $\mathcal{M}_n(R)$ (with $n > 1$) implies the 0-primitivity of R, is still an unsolved problem. The result is known to be true in certain restricted cases. In this talk, some new light is shed on this problem.

On radicals defined by prime ideals

Rainer Mlitz, Wien

In 1989, K.Beidar has shown that in many varieties of algebras over a commutative ring with identity every Kurosh-Amitsur radical defined as intersection of prime ideals has a hereditary radical class and is consequently a special radical. He fully described the regular classes of prime algebras determining an upper radical of that type. We discuss the possibility of extension of these results to nearrings.

Higher commutators and multilinear expanded groups

Nebojša Mudrinski, Novi Sad

Higher commutators are introduced by A. Bulatov and already have some applications. We investigate them now in multilinear expanded groups. Multilinear expanded groups are expanded groups whose all nongroup fundamental operations are linear on each argument when other arguments are fixed. We give a connection between higher commutators of distinct lengths. Furthermore, we can show that the property of affine completeness is decidable in case of nilpotent multilinear expanded groups. For the same class polynomial equivalence problem has polynomial time complexity in the length of the input terms.

This is a joint work with E. Aichinger (JKU Linz).

Local methods for Rosenberg relations

Maja Pech, Novi Sad

In this talk we develop local methods for studying the structure of the weak Krasner algebras generated by Rosenberg relations. In particular, this gives a complete understanding of the distributive lattices of m-ary relations in these algebras. Such knowledge is crucial for the enumeration of all relations whose endomorphism monoid is a supermonoid of the endomorphism monoid of a Rosenberg relation.

Compatible Extensions of Nearrings

Gary L. Peterson, Harrisonburg, Virginia

If R is a zero-symmetric nearring with 1 and G is a faithful R-module, a compatible extension of R is a subnearring S of $M_0(G)$ containing R such that G is a compatible S-module and the R-ideals and S-ideals of G coincide. We shall see that the set of these compatible extensions forms a complete lattice and some results involving members of this lattice will also be presented.

Near-rings in agriculture

Günter Pilz, Linz

Planar near-rings are known to yield excellent balanced incomplete block designs, which in turn produce very efficient designs of statistical experiments. The use of planar near-rings in statistical experiments in agriculture are shown by means of examples, and the statistical analysis is described, including the discovery and computation of positive and negative synergy effects.

Generation of $M_0(V)$ from a group theory perspective

Stuart Scott, Auckland

The p-gen problem for $M_0(V)$ has now been solved entirely. Its solution heads in two directions. There is the nearring theory (much of it) and the very meaningful group theory question it gives rise to. It is the second matter I will be dealing with. This involves us in investigating finite simple groups thereby reducing the problem to the soluble case which can, after considerable effort, be disposed of.

On right neardomain

Andrey A. Simonov, Novosibirsk

In [1] for exposition of *sharply 2–transitive groups* the concept *neardomain* is introduced as algebraic system with two binary operations $(B_1, 0, \cdot, +, r)$. Until recently it is not known any example of a neardomain which is not a nearfield. In the given work it is offered to loosen neardomain axioms, having left only necessary ones for construction of sharply 2–transitive groups. Let's define the right neardomain as algebraic system $(B_1, 0, v, \cdot, +, -, h, r)$ with operations:

$(+) : B \times B_1 \to B,\ (-) : B \times B_1 \to B,\ (\cdot) : B \times B_1 \to B,$ where $B = B_1 \cup \{1\}$ and

$$v : B_1 \to B_1,\ h : B_1 \times B_1 \to B_1,\ r : B_1 \times B_1 \to B_1,$$

for which axioms are fulfilled
A1. $(\forall x \in B)(\forall y \in B_1)\ (x - y) + y = x$;
A2. $(\forall x \in B)(\forall y \in B_1)\ (x + y) - y = x$;
A3. $(\forall x \in B_1)\ \ x - x = 0$;
A4. $(B_1, \cdot, e)$ is a group with a unit element $e \in B_1$;
A5. $(\forall x \in B)(\forall y, z \in B_1)(\exists\ h(y, z) \in B_1)\ (x + y)z = xh(y, z) + yz$;
A6. $(\forall x \in B)(\forall y, z \in B_1 :\ \ y + z \neq 0)(\exists\ r(y, z) \in B_1)(x + y) + z = xr(y, z) + (y + z)$;
A7. $(\forall x \in B)(\forall z \in B_1)(\exists\ v(z) \in B_1)\ (x + (0 - z)) + z = xv(z)$.

Let's define a map $L(x) = 0 - x$, then from A1 follows $L(x) + x = 0$. Thus map $L : B_1 \to B_1$ defines left inverse in the right loop.

Lemma. *In the right neardomain the following properties hold:*
1. $(\forall x \in B_1)\ 0x = 0$*;*
2. $h(x, y) = EL(x)L(xy)$*, where* $E(x) = x^{-1}$*;*
3. $r(y, z) = (L(z) - y)^{-1}L(y + z)$*;*
4. $x - z = xv^{-1}(z) + L(z)$*;*
5. $v(z) = EL^2(z)z$*, where* EL *— superposition of transformations* L *and* E*.*

The group $T_2(B)$ of transformations of a set B is called sharply 2–transitive group, if for arbitrary pairs $(x_1, x_2) \neq (y_1, y_2) \in \widehat{B^2}$, where $\widehat{B^2} = B^2 \setminus \{(x, x) | x \in B\}$ there exists an unique element $g \in T_2(B)$ for which the equalities $g(x_1) = y_1$ and $g(x_2) = y_2$ are hold.

Theorem. *Algebraic systems* $(B_1, 0, \varphi, \cdot)$ *and sharply 2–transitive groups* $T_2(B)$ *are rational equivalent.*

The concept *rational equivalence* is introduced by Maltsev A. I. [2].

Let's consider some examples of the right neardomains constructed over a skew field $\mathbf{K}$:
1. $x \oplus y = -xa^{-1} + y,\ x \ominus y = -xa + ay,\ r(y, z) = -a^{-1},\ v(z) = a^{-2},\ h(y, z) = z.$
2. $x \oplus y = xy^2 + y,\ x \ominus y = xy^{-2} - y^{-1},\ r(y, z) = y^2 z(z + y)^{-1}(yz + 1),\ h(y, z) = z^{-1}.$

References

[1] *Karzel H.* Inzidenzgruppen I. Lecture Notes by Pieper, I. and Sorensen, K., University of Hamburg (1965), 123-135.

[2] *Maltsev A. I.* Structural performance of some classes of algebras, Doklady of the Academy of Sciences of the USSR, 120, No. 1, 29-32, 1958.

Polynomial near-rings

Stefan Veldsman, Muscat, Oman

Polynomials, in one form or the other, is one of the oldest entities studied in mathematics. They are intimately entwined in the historical development of mathematics; from the ancient times to our age. The formalism which became part and parcel of mathematics during the twentieth century, opened new doors for defining polynomials over arbitrary algebraic structures ? in particular also over near-rings.

This talk will be on polynomials over near-rings using a model proposed by Andries P.J. van der Walt. After a brief survey of the theory to date, I will show that some of the well-known connections between polynomial rings and matrix rings extend to the near-ring case. This will be followed by what is always a sticky topic outside the realm of commutative rings and even more so for near-rings, namely substitutions in polynomials and polynomial functions over near-rings.

Minimal Left Ideals in Near-rings

Gerhard Wendt, Linz

We show that any minimal left ideal L in a finite zero symmetric near-ring N is a planar near-ring provided that L is not contained in the Jacobson Radical of type 2 and does not have trivial multiplication.

Modules, comodules and contramodules

Robert Wisbauer, Düsseldorf

Let R be a commutative ring and $\mathbf{M}_R$ the category of R-modules. It is well known in module theory that any R-module A is an *R-algebra* if and only if the functor $A \otimes_R - : \mathbf{M}_R \to \mathbf{M}_R$ is a *monad.* Similarly, an R-module C is an *R-coalgebra* provided the functor $C \otimes_R - : \mathbf{M}_R \to \mathbf{M}_R$ is a *comonad.* In fact, algebras and coalgebras are the prototypes for the categorical notions of monads and comonads.

The purpose of the talk is to sketch the categorical versions of these notions and their fundamental properties. We address the question to which extent these structures are of interest for near rings - but we are not (yet) able to give a comprehensive answer.

A Remark on the Extended Sum of two Radical Classes of Hemirings

Muhammad Zulfiqar, Lahore

The concept of the sum of radical classes of rings was introduced by Y. L. Lee and R. E. Propes, and further extended by R. E. Propes and A. M. Zaidi as the extended sum of the two radical classes. In this paper, we develop a relationship between these sums and show that two concepts coincide when the sum is a radical class of hemiring and also generalize several results of R. E. Propes and A. M. Zaidi.

Talks

Jawad ABUHLAIL	*Monads and comonads in categories of semimodules over semirings*
Erhard AICHINGER	*An instance of the subnearring membership problem*
Franz BINDER	*Algorithmic nearring theory*
Gary BIRKENMEIER	*E(G,K) and related nearrings*
Geoff BOOTH	*The strongly prime radical in nearrings of continuous functions*
Tim BOYKETT	*Seminearrings of polynomials and order preserving functions on lattices*
G.Alan CANNON	*Rings determined by cyclic covers of groups*
Nico GROENEWALD	*The notion of prime in nearrings*
Wolfgang HERFORT	*Comments on periodic multiplicative groups of nearfields*
Karin-Therese HOWELL	*Maximal endomorphism semirings*
Suresh JUGLAL	*Primeness in the generalized group near-ring*
Wen-Fong KE	*The cardinality of some symmetric differences*
László MÁRKI	*Semiabelian categories*
Carl MAXSON	*Maximal subnearrings of functions*
Peter MAYR	*Nearrings of polynomial functions on expanded groups*
Johan MEYER	*On an open question regarding 0-primitivity and matrix nearrings*
Rainer MLITZ	*On radicals defined by prime ideals*
Nebojša MUDRINSKI	*Higher commutators and multilinear expanded groups*
Maja PECH	*Local Methods for Rosenberg relations*
Gary PETERSON	*Compatible extensions of nearrings*
Günter PILZ	*Nearrings in agriculture*
Stuart SCOTT	*Generation of $M_0(V)$ from a group theory perspective*
Stefan VELDSMAN	*Polynomial nearrings*
Gerhard WENDT	*Minimal left ideals in nearrings*
Robert WISBAUER	*Modules, comodules and contramodules*

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