ANTALYA CEBİR GÜNLERİ IV
22-26 Mayıs 2002
ÖZETLER

ABSTRACTS
May 22-26, 2002
ANTALYA ALGEBRA DAYS IV
# Antalya Algebra Days IV
May 22-26, 2002 Antalya, Turkey

## List of Participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ummuhan Acar</td>
<td><a href="mailto:uscar@hacettepe.edu.tr">uscar@hacettepe.edu.tr</a></td>
<td>Hacettepe Üniversitesi</td>
</tr>
<tr>
<td>Ersan Akıldız</td>
<td><a href="mailto:ersan@metu.edu.tr">ersan@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Murat Alan</td>
<td><a href="mailto:muratalm2002@yahoo.com">muratalm2002@yahoo.com</a></td>
<td>Yıldız Teknik Üniversitesi</td>
</tr>
<tr>
<td>Toma Albı</td>
<td><a href="mailto:albu@atilim.edu.tr">albu@atilim.edu.tr</a></td>
<td>Atılım Üniversitesi</td>
</tr>
<tr>
<td>Rafail Alizade</td>
<td><a href="mailto:alizade@ikya.lyte.edu.tr">alizade@ikya.lyte.edu.tr</a></td>
<td>İYTE</td>
</tr>
<tr>
<td>Gökhan Alptekin</td>
<td><a href="mailto:eg_alptekin@yahoo.com">eg_alptekin@yahoo.com</a></td>
<td>Selçuk Üniversitesi</td>
</tr>
<tr>
<td>Ercan Altintiğk</td>
<td><a href="mailto:altintigk@seluk.edu.tr">altintigk@seluk.edu.tr</a></td>
<td>Selçuk Üniversitesi</td>
</tr>
<tr>
<td>Nurcan Arğaç</td>
<td><a href="mailto:argac@scl.egi.edu.tr">argac@scl.egi.edu.tr</a></td>
<td>Ege Üniversitesi</td>
</tr>
<tr>
<td>Sefa Feza Anları</td>
<td><a href="mailto:feza@math.metu.edu.tr">feza@math.metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Lucian Badescu</td>
<td><a href="mailto:lbadescu@tga.math.unibuc.ro">lbadescu@tga.math.unibuc.ro</a></td>
<td>University of Bucharest</td>
</tr>
<tr>
<td>Hayati Bennun</td>
<td><a href="mailto:bennun62@math.metu.edu.tr">bennun62@math.metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Ayşe Berkman</td>
<td><a href="mailto:berkman@math.metu.edu.tr">berkman@math.metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Cansu Betin</td>
<td><a href="mailto:betin@metu.edu.tr">betin@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Özlem Beyarslan</td>
<td><a href="mailto:obeyarslan@yahoo.com">obeyarslan@yahoo.com</a></td>
<td>University of Illinois at Chicago</td>
</tr>
<tr>
<td>Dogan Bilge</td>
<td><a href="mailto:doganbilge@mac.com">doganbilge@mac.com</a></td>
<td>Bilgi Üniversitesi</td>
</tr>
<tr>
<td>Meşharp Bilhan</td>
<td><a href="mailto:bilhan@metu.edu.tr">bilhan@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Durnuğ Bozkurt</td>
<td><a href="mailto:dbozkurt@seluk.edu.tr">dbozkurt@seluk.edu.tr</a></td>
<td>Selçuk Üniversitesi</td>
</tr>
<tr>
<td>Engin Büyükkaşı</td>
<td><a href="mailto:ebuyuk@ikya.iyte.edu.tr">ebuyuk@ikya.iyte.edu.tr</a></td>
<td>İYTE</td>
</tr>
<tr>
<td>Mahr Bilen Can</td>
<td><a href="mailto:canm@math.upenn.edu">canm@math.upenn.edu</a></td>
<td>University of Pennsylvania</td>
</tr>
<tr>
<td>James B. Carrell</td>
<td><a href="mailto:carrell@math.ubc.ca">carrell@math.ubc.ca</a></td>
<td>University of British Columbia</td>
</tr>
<tr>
<td>Emrah Çakacak</td>
<td><a href="mailto:cacak@metu.edu.tr">cacak@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Hamza Çalışçı</td>
<td><a href="mailto:hcalisici@omu.edu.tr">hcalisici@omu.edu.tr</a></td>
<td>19 Mayıs Üniversitesi</td>
</tr>
<tr>
<td>Fatih Çalışlıp</td>
<td><a href="mailto:fcalilip@dogus.edu.tr">fcalilip@dogus.edu.tr</a></td>
<td>Doğuş Üniversitesi</td>
</tr>
<tr>
<td>Olğur Çelikbaş</td>
<td><a href="mailto:e122452@metu.edu.tr">e122452@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Yalın Firat Çeliker</td>
<td><a href="mailto:ycelikle@math.purdue.edu">ycelikle@math.purdue.edu</a></td>
<td>Purdue University</td>
</tr>
<tr>
<td>Aya Çeşmeloğlu</td>
<td><a href="mailto:cesmelologlu@sabanciuniv.edu">cesmelologlu@sabanciuniv.edu</a></td>
<td>Sabancı Üniversitesi</td>
</tr>
<tr>
<td>Ahmet Sinan Çevik</td>
<td><a href="mailto:scevik@balikesir.edu.tr">scevik@balikesir.edu.tr</a></td>
<td>Balıkesir Üniversitesi</td>
</tr>
<tr>
<td>Nursu Cimen</td>
<td><a href="mailto:ncimen@hacettepe.edu.tr">ncimen@hacettepe.edu.tr</a></td>
<td>Hacettepe Üniversitesi</td>
</tr>
<tr>
<td>Mustafa Coban</td>
<td><a href="mailto:mustafacoban@sabanciuniv.edu">mustafacoban@sabanciuniv.edu</a></td>
<td>Sabancı Üniversitesi</td>
</tr>
<tr>
<td>Arnoldo García</td>
<td><a href="mailto:garcia@impa.br">garcia@impa.br</a></td>
<td>IMPA</td>
</tr>
<tr>
<td>Beste Güler</td>
<td><a href="mailto:beste@math.metu.edu.tr">beste@math.metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Burcu Gülmel</td>
<td><a href="mailto:bgulmez@metu.edu.tr">bgulmez@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Cem Gürer</td>
<td><a href="mailto:gurer@sabanciuniv.edu">gurer@sabanciuniv.edu</a></td>
<td>Sabancı Üniversitesi</td>
</tr>
<tr>
<td>Gonca Gümüşoğlu</td>
<td><a href="mailto:gunya@hacettepe.edu.tr">gunya@hacettepe.edu.tr</a></td>
<td>Hacettepe Üniversitesi</td>
</tr>
<tr>
<td>Sait Halıcıoğlu</td>
<td><a href="mailto:sais.Halicioglu@science.ankara.edu.tr">sais.Halicioglu@science.ankara.edu.tr</a></td>
<td>Ankara Üniversitesi</td>
</tr>
<tr>
<td>Abdullah Harmançı</td>
<td><a href="mailto:harmandi@hacettepe.edu.tr">harmandi@hacettepe.edu.tr</a></td>
<td>Hacettepe Üniversitesi</td>
</tr>
<tr>
<td>Gündüz Ikeda</td>
<td><a href="mailto:iokeda@gorsey.gov.tr">iokeda@gorsey.gov.tr</a></td>
<td>Feza Güreş Enstitüsü</td>
</tr>
<tr>
<td>Semra Kaptanoğlu</td>
<td><a href="mailto:semra@math.metu.edu.tr">semra@math.metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Fatih Karabacak</td>
<td><a href="mailto:fkarabac@anadolu.edu.tr">fkarabac@anadolu.edu.tr</a></td>
<td>Anadolu Üniversitesi</td>
</tr>
<tr>
<td>Ulaş Karadag</td>
<td><a href="mailto:karadugalas@hotmail.com">karadugalas@hotmail.com</a></td>
<td>Bilgi Üniversitesi</td>
</tr>
<tr>
<td>Kivlicim Kılıç</td>
<td><a href="mailto:kivilcik@hotmail.com">kivilcik@hotmail.com</a></td>
<td>Bilgi Üniversitesi</td>
</tr>
<tr>
<td>Özgür Kıpışel</td>
<td><a href="mailto:akipiseli@math.metu.edu.tr">akipiseli@math.metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Cemal Koç</td>
<td><a href="mailto:cko@dogus.edu.tr">cko@dogus.edu.tr</a></td>
<td>Doğuş Üniversitesi</td>
</tr>
<tr>
<td>Fatih Koyuncu</td>
<td><a href="mailto:fatih@metu.edu.tr">fatih@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Feride Kuzuoğlu</td>
<td><a href="mailto:feridek@hacettepe.edu.tr">feridek@hacettepe.edu.tr</a></td>
<td>Hacettepe Üniversitesi</td>
</tr>
<tr>
<td>Mahmut Kuzuoğlu</td>
<td><a href="mailto:mahmut@metu.edu.tr">mahmut@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Özgür Küçük</td>
<td><a href="mailto:kucuk@uekaa.uekaa.tubitak.gov.tr">kucuk@uekaa.uekaa.tubitak.gov.tr</a></td>
<td>Sabancı Üniversitesi</td>
</tr>
<tr>
<td>Selda Küçükoğlu</td>
<td><a href="mailto:skucukoglu@ku.edu.tr">skucukoglu@ku.edu.tr</a></td>
<td>Koç Üniversitesi</td>
</tr>
<tr>
<td>Name</td>
<td>Email</td>
<td>Institution</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Ivan Landjev</td>
<td><a href="mailto:ivan@mol.math.bas.bg">ivan@mol.math.bas.bg</a></td>
<td>Bulgarian Academy of Sciences</td>
</tr>
<tr>
<td>Vladimir Levcuk</td>
<td><a href="mailto:levcuk@lan.krasu.ru">levcuk@lan.krasu.ru</a></td>
<td>Krasnoyarsk University</td>
</tr>
<tr>
<td>Nikolai Lazarov</td>
<td><a href="mailto:nmanev@mol.math.bas.bg">nmanev@mol.math.bas.bg</a></td>
<td>Bulgarian Academy of Sciences</td>
</tr>
<tr>
<td>Engin Memut</td>
<td><a href="mailto:engin.mermut@deu.edu.tr">engin.mermut@deu.edu.tr</a></td>
<td>19 Mayıs Üniversitesi</td>
</tr>
<tr>
<td>Özgur Mut</td>
<td><a href="mailto:ozgur@math.metu.edu.tr">ozgur@math.metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Ali Nesarı</td>
<td><a href="mailto:anesrin@yahoo.com">anesrin@yahoo.com</a></td>
<td>Bilgi Üniversitesi</td>
</tr>
<tr>
<td>Ferruh Özbudak</td>
<td><a href="mailto:ozbudak@math.metu.edu.tr">ozbudak@math.metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Ayşe Çiğdem Özcân</td>
<td><a href="mailto:ozcansen@hacettepe.edu.tr">ozcansen@hacettepe.edu.tr</a></td>
<td>Hacettepe Üniversitesi</td>
</tr>
<tr>
<td>İbrahim Özen</td>
<td><a href="mailto:lozen@fen.bilkent.edu.tr">lozen@fen.bilkent.edu.tr</a></td>
<td>Bilkent Üniversitesi</td>
</tr>
<tr>
<td>Mehmet Özen</td>
<td><a href="mailto:ozen@sakarya.edu.tr">ozen@sakarya.edu.tr</a></td>
<td>Sakarya Üniversitesi</td>
</tr>
<tr>
<td>Alp Öztarkan</td>
<td><a href="mailto:alp@vekue.vekue.tubitak.gov.tr">alp@vekue.vekue.tubitak.gov.tr</a></td>
<td>Sabancı Üniversitesi</td>
</tr>
<tr>
<td>Erdal Ozsurt</td>
<td><a href="mailto:ozsurt@math.metu.edu.tr">ozsurt@math.metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Ali Pancar</td>
<td><a href="mailto:apancar@umu.edu.tr">apancar@umu.edu.tr</a></td>
<td>19 Mayıs Üniversitesi</td>
</tr>
<tr>
<td>David Pierce</td>
<td>d <a href="mailto:pierce@metu.edu.tr">pierce@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Serhat Sağcıoğlu</td>
<td><a href="mailto:se108240@metu.edu.tr">se108240@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Duhyu Salar</td>
<td><a href="mailto:duhyu_salar@hotmail.com">duhyu_salar@hotmail.com</a></td>
<td>Bilgi Üniversitesi</td>
</tr>
<tr>
<td>Sinan Sertöz</td>
<td><a href="mailto:sertoz@fen.bilkent.edu.tr">sertoz@fen.bilkent.edu.tr</a></td>
<td>Bilkent Üniversitesi</td>
</tr>
<tr>
<td>Mahmoud Shalafeth</td>
<td><a href="mailto:mahmoud@fen.bilkent.edu.tr">mahmoud@fen.bilkent.edu.tr</a></td>
<td>Bilkent Üniversitesi</td>
</tr>
<tr>
<td>Süleyman Solak</td>
<td><a href="mailto:solak42@yahoo.com">solak42@yahoo.com</a></td>
<td>Selçuk Üniversitesi</td>
</tr>
<tr>
<td>Henning Stichtenoth</td>
<td><a href="mailto:stichtenoth@uni-essen.de">stichtenoth@uni-essen.de</a></td>
<td>University of Essen</td>
</tr>
<tr>
<td>Leo Storme</td>
<td><a href="mailto:ls@cage.rug.ac.be">ls@cage.rug.ac.be</a></td>
<td>Ghent University</td>
</tr>
<tr>
<td>Mesut Sahin</td>
<td><a href="mailto:sahin@fen.bilkent.edu.tr">sahin@fen.bilkent.edu.tr</a></td>
<td>Bilkent Üniversitesi</td>
</tr>
<tr>
<td>İrfan Siap</td>
<td><a href="mailto:irfansiap@hotmail.com">irfansiap@hotmail.com</a></td>
<td>Gaziantep Üniversitesi</td>
</tr>
<tr>
<td>Figen Taki</td>
<td><a href="mailto:figen@anadolu.edu.tr">figen@anadolu.edu.tr</a></td>
<td>Anadolu Üniversitesi</td>
</tr>
<tr>
<td>Iskender Taşdelen</td>
<td><a href="mailto:iskender@metu.edu.tr">iskender@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Necati Taşkara</td>
<td><a href="mailto:ntaskara@selcuk.edu.tr">ntaskara@selcuk.edu.tr</a></td>
<td>Selçuk Üniversitesi</td>
</tr>
<tr>
<td>Ünsal Tekir</td>
<td><a href="mailto:utekir@marmara.edu.tr">utekir@marmara.edu.tr</a></td>
<td>Marmara Üniversitesi</td>
</tr>
<tr>
<td>Adnan Tercan</td>
<td><a href="mailto:tercan@hacettepe.edu.tr">tercan@hacettepe.edu.tr</a></td>
<td>Hacettepe Üniversitesi</td>
</tr>
<tr>
<td>Simon Thomas</td>
<td><a href="mailto:stomas@math.rutgers.edu">stomas@math.rutgers.edu</a></td>
<td>Rutgers University</td>
</tr>
<tr>
<td>Andreas Tiefenbach</td>
<td><a href="mailto:tiefenbach@metu.edu.tr">tiefenbach@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Alex Timofoonko</td>
<td><a href="mailto:a.v.timofoonko52@mail.ru">a.v.timofoonko52@mail.ru</a></td>
<td>Krasnoyarsk University</td>
</tr>
<tr>
<td>Vladimir Tolstykh</td>
<td><a href="mailto:tylaas@yahoo.com">tylaas@yahoo.com</a></td>
<td>Bilgi Üniversitesi</td>
</tr>
<tr>
<td>Pınar Mote Topaloğlu</td>
<td><a href="mailto:pinarm@metu.edu.tr">pinarm@metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>Alev Topuzoğlu</td>
<td><a href="mailto:slev@sabancuniv.edu">slev@sabancuniv.edu</a></td>
<td>Sabancı Üniversitesi</td>
</tr>
<tr>
<td>Naim Tuğlu</td>
<td><a href="mailto:mtuglu@selcuk.edu.tr">mtuglu@selcuk.edu.tr</a></td>
<td>Selçuk Üniversitesi</td>
</tr>
<tr>
<td>Demirhan Ramazan</td>
<td><a href="mailto:demirhan@math.bilkent.edu.tr">demirhan@math.bilkent.edu.tr</a></td>
<td>Bilkent Üniversitesi</td>
</tr>
<tr>
<td>Nesrin Tutas</td>
<td><a href="mailto:nesrin@pascal.scl.akdeniz.edu.tr">nesrin@pascal.scl.akdeniz.edu.tr</a></td>
<td>Akdeniz Üniversitesi</td>
</tr>
<tr>
<td>Seyfi Türkelli</td>
<td><a href="mailto:seyfiturkelli@hotmail.com">seyfiturkelli@hotmail.com</a></td>
<td>Bilgi Üniversitesi</td>
</tr>
<tr>
<td>Ramazan Türkmen</td>
<td><a href="mailto:turkmen@selcuk.edu.tr">turkmen@selcuk.edu.tr</a></td>
<td>Selçuk Üniversitesi</td>
</tr>
<tr>
<td>Roger Wiegand</td>
<td><a href="mailto:rwiegand@math.unl.edu">rwiegand@math.unl.edu</a></td>
<td>University of Nebraska</td>
</tr>
<tr>
<td>Sylvia Wiegand</td>
<td><a href="mailto:swiegand@math.unl.edu">swiegand@math.unl.edu</a></td>
<td>University of Nebraska</td>
</tr>
<tr>
<td>Ergun Yalçın</td>
<td><a href="mailto:yalcine@fen.bilkent.edu.tr">yalcine@fen.bilkent.edu.tr</a></td>
<td>Bilkent Üniversitesi</td>
</tr>
<tr>
<td>Aynur Yalçınker</td>
<td><a href="mailto:ayalciner@selcuk.edu.tr">ayalciner@selcuk.edu.tr</a></td>
<td>Selçuk Üniversitesi</td>
</tr>
<tr>
<td>Şükrü Yalçınkaya</td>
<td><a href="mailto:sukrue@math.metu.edu.tr">sukrue@math.metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
<tr>
<td>H. Murat Yıldırım</td>
<td><a href="mailto:murat@math.metu.edu.tr">murat@math.metu.edu.tr</a></td>
<td>ODTÜ</td>
</tr>
</tbody>
</table>
Abstract CoGalois Theory for Profinite Groups
Toma Albu
Atılım University, Ankara
email: albu@atilim.edu.tr

The efforts to generalize the well-known Gauss’ Quadratic Reciprocity Law led to the
theory of Abelian extensions of algebraic and $p$-adic number fields, known as Classfield
Theory. This theory can be also developed in an abstract group theoretic framework,
namely for profinite profinite groups. Since the profinite groups are precisely those topo-
logical groups which arise as Galois groups of Galois extensions, an Abstract Galois Theory
for arbitrary profinite groups was developed within the General Classfield Theory.

The purpose of our talk is to present a dual theory to the Abstract Galois Theory,
which we called Abstract Cogalois Theory. Roughly speaking, Cogalois Theory investigates
field extensions, finite or not, which possess a Cogalois correspondence. This theory is
somewhat dual to the very classical Galois Theory dealing with field extensions possessing
a Galois correspondence.

The basic concepts of Cogalois Theory, namely that of $G$-Kneser and $G$-Cogalois field
extension, as well as their main properties are generalized to arbitrary profinite groups.
More precisely, let $\Gamma$ be an arbitrary profinite group, and let $A$ be any subgroup of the
Abelian group $Q/Z$ such that $\Gamma$ acts continuously on the discrete group $A$. Then, one
defines the concepts of Kneser subgroup and Cogalois subgroup of the group $\mathbb{Z}^1(\Gamma, A)$
of all continuous 1-cocycles of $\Gamma$ with coefficients in $A$, and one establish their main
properties.

These results were obtained jointly with Şerban Basarab (Bucharest, Romania).

Cofinitely Weak Supplemented Modules
Rafail Alizade and Engin Büyükaşık
IYTE, FAMIT TURKEY
e-mail: alizade@likya.iyte.edu.tr, ebuyuk@likya.iyte.edu.tr

Throughout $R$ will denote an associative ring with identity and all modules are unital left
$R$-modules. A submodule $N$ of a module $M$ has a weak supplement $L$ in $M$ if $N + L = M$
and $N \cap L \ll M$ (see [L] and [Z]). A submodule $N$ of a module $M$ is called cofinite if
the factor module $M/N$ is finitely generated. The module $M$ is called cofinitely weak
supplemented ($cws$) if every cofinite submodule has a weak supplement.

If $M$ is a cofinitely weak supplemented module than any $M$-generated module is cofinitely
weak supplemented.

For a module $M$ let $\Gamma$ be the set of all cyclic submodules $K = Ra$ such that $K$ is a weak
supplement for some maximal submodule of $M$, and let $cws(M)$ denote the sum of all
submodules from $\Gamma$.

Theorem 1 The following statements are equivalent for a module $M$.
1. $M$ is a $cws$- module,
2. Every maximal submodule of $M$ has a weak supplement,
3. $M/cws(M)$ has no maximal submodule.

Theorem 2 Let $M$ be an $R$-module with $Rad(M \ll M)$. Then the following statements
are equivalent.
1. $M$ is a $cws$-module,
2. $M/Rad(M)$ is a $cws$-module,
3. Every cofinite submodule of $M/Rad(M)$ is a direct summand,
4. Every maximal submodule of $M/Rad(M)$ is a direct summand,
5. Every maximal submodule of $M$ has a weak supplement.

Theorem 3 The ring $R$ is semilocal if and only if every $R$-module is a $cws$-module.

References

Homological Aspects of Complements and Supplements
Rafail Alizade and Engin Mermut
İzmir Yüksek Teknoloji Enstitüsü and Dokuz Eylül University
e-mail: alizade@likya.iyte.edu.tr, engin.mermut@deu.edu.tr

It is well known that neat subgroups of abelian groups coincide with high subgroups (i.e. complement subgroups). Also the class of all short exact sequences $0 \rightarrow A \rightarrow B \rightarrow C \rightarrow 0$ of modules where image of $A$ is the complement[supplement] of a submodule of $B$ forms a proper class. Generalizing the known results for neat subgroups of abelian groups, we can ask injectives, projectives, coinjectives, coprojectives and other homological characterization for these two dual proper classes in the categories of modules.

On Matrix Norms of GCD and LCM Matrices
Ercan Altınısık
Selçuk University, Akoren
e-mail: ealtinisik@selcuk.edu.tr

Ali Rıza Ercan
Vocational College, 42461 Akoren-Konya

Naim Tuglu
Selçuk University, Department of Mathematics
42031 Campus-Konya
e-mail: ntuglu@selcuk.edu.tr

Dursun Taşçı
Gazi University, Department of Mathematics
06500 Teknikokullar-Ankara
e-mail: dtasci@gazi.edu.tr

Let $S = \{x_1, x_2, \ldots, x_n\}$ be a set of distinct positive integers. The matrices $(S) = ((x_i, x_j))_{n \times n}$ and $[S] = ([x_i, x_j])_{n \times n}$ are called greatest common divisor (gcd) matrices and least common multiple (lcm) matrices on the set $S$, where $(x_i, x_j)$ and $[x_i, x_j]$ denote the greatest common divisor and the least common multiple of $x_i$ and $x_j$ respectively. The matrix $[S] = \left( \left( \frac{x_i}{x_i, x_j} \right) \right)_{n \times n}$ is said to be the almost Hilbert-Smith matrix on $S$, and $[S^*] = \ldots$
\[ \left( \frac{x_i z_j}{y_i y_j} \right)_{n \times n} \] is a generalization of the almost Hilbert-Smith matrix on \( S \), where \( r \) is a positive real number.

In the first section, we introduce GCD and LCM matrices and give definitions of matrix norms. In the second section, we investigate matrix norms of GCD and LCM matrices and present some open problems on matrix norms of these matrices. Then we investigate matrix norms of the almost Hilbert-Smith matrix on the set \( S = \{1, 2, \ldots, n\} \) and then we prove the following theorems:

**Theorem:** Let \([S_n]\) be the \( n \times n\) almost Hilbert-Smith matrix on \( S = \{1, 2, \ldots, n\} \) and \( \|\cdot\|_E \) denote the Euclidean norm. Then \( \lim_{n \to \infty} \|[S_n]\|_E = \frac{\zeta(3)^{3/2}}{\zeta(4)^{1/2}} = \frac{\sqrt{60}}{12} \pi \), where \( \zeta \) is the Riemann zeta function.

**Theorem:** Let \( r \) be a positive real number and \( \|\cdot\|_p \) denote the \( l_p \) matrix norm \((1 \leq p < \infty)\). Then \( \lim_{n \to \infty} \|[S_n^r]\|_p = \frac{\zeta(r p)^{3/2}}{\zeta(2 p)^{1/2}} \) such that \( r > \frac{1}{p} \).

In the lights of these theorems, we finally present some corollaries and open problems on the matrix norms of \([S_n^r]\).

**References**


On centroid and extended centroid of rings  
N.Argaç and K.N.Ponomarëv  
Ege University, Science Faculty, Department of Mathematics, 35100, Bornova,IZMIR  
e-mail: argac@sci.ege.edu.tr  
Novosibirsk State Technical University, Algebra and Logic Department, Novosibirsk-92, RUSSIA  

We work in the category of nonassociative rings or in the category of nonassociative $K$-algebras over some commutative ring $K$.  

For an associative ring $R$ in the endomorphisms ring $E(R)$ there are two different but apparently close subrings. There are centroid of the ring $(R)$ and extended centroid $(R)$.  

Nevertheless until now there is some deep difference between these notions. We prove some property of extended centroid for the class of semiprime nonassociative rings. We point on some classes of nonassociative rings where extended centroid is in some close correspondence with centroid.  

Firstly for the whole class of rings we define the notion of extended centroid $(R)$. This approach follows to Beidar and Mikhailov construction of extended centroid for a prime nonassociative ring (see [Beid] section 9.2). We show for a ring $R$ extended centroid $(R)$ is associative ring with unity, there is natural homomorphism of centroid into extended centroid $n : (R) \to (R)$.  

Secondly for the class of semiprime rings we prove the homomorphism $n$ is inclusion of commutative rings. We prove extension of well known property of extended centroid for associative rings for the whole class of nonassociative rings.  

Let $R$ be any semiprime ring (not necessary associative). Then extended centroid $(R)$ is a commutative von Neumann regular ring.  

We are interested in for which class of semiprime rings there are equalities $(R) = (R)$ or $Q((R)) = (R)$? Here $Q()$ is maximal quotient ring of commutative ring (see [Lam]).  

Proposition Let $R$ be any associative prime algebra over commutative ring $K$ and let it satisfies some polynomial identity with coefficients from $K$. Then $Q((R)) = (R)$.  

Let $R$ be any Artinian semisimple ring. Then $(R) = (R)$.  

References  

Extending Meromorphic Functions in Algebraic Geometry  
L. Badescu  
University of Bucharest, Romania  
e-mail : lbadescu@gtmath.unibuc.ro  

Let $X$ be an irreducible algebraic variety defined over an algebraically closed field $k$, and let $Y$ be a connected closed subvariety of $X$. On the formal completion $X_{Y}$ of $X$ along $Y$ we may consider the sheaf $M$ of formal-rational functions of $X$ along $Y$. Unlike the usual sheaf of rational functions on $X$, the sheaf $M$ is very far from being a constant sheaf. Taking global sections of $M$ we get the $k$-algebra $K(X_{Y})$ of (global) formal-rational functions of $X$ along $Y$. Then there is natural map of $k$-algebras $K(X) \to K(X_{Y})$ from the field $K(X)$ of rational functions of $X$. If $k$ is the field of complex numbers and if $U$ is a small connected neighborhood of $Y$ in $X$ (in the complex topology) then the above
map together some GAGA-arguments yield the inclusions
\[ K(X) \subseteq M(U) \subseteq K(X/Y) \]

The aim of this lecture is to discuss conditions under which these inclusions (if \( k \) is the field of complex numbers) are actually equalities. The presentation, intended for a general audience, will include examples and motivation.

Singularities of Schubert varieties
James Carrell
University of British Columbia, Canada
E-mail: carrell@math.ubc.ca

The work of Kazhdan and Lusztig in the 1980's greatly illuminated the nature of the topological singularities of Schubert varieties in the flag variety of a semi-simple algebraic group \( G \) over an algebraically closed field by associating to every singularity a certain computable non-constant polynomial. This has stimulated a number of diverse approaches to understanding both the topological and algebro-geometric singularities of Schubert varieties. One of the most fruitful techniques, introduced by Dale Peterson, has been to study the Nash blow up of a Schubert variety \( X \) at a fixed point of a maximal torus in \( G \) acting on \( X \). We will describe how this method leads to a natural description of the singular locus of a Schubert variety (in fact of a much larger class of varieties).

Subfields of the Function Fields of Deligne-Lusztig Curves Associated to Ree Groups
Emrah Çakçak
METU, Ankara.
E-mail: cakcak@metu.edu.tr

Let \( G \) be a Ree group of order \( q^3(q - 1)(q^2 + 1) \) with \( q = 3^{2s+1}, s \geq 1 \) and \( X \) a Deligne-Lusztig curve assuming \( G \) as its automorphism group. It is known that \( X \) is an irreducible curve defined over \( \mathbb{F}_q \) and its function field \( F \) (over \( \mathbb{F}_q \)) is isomorphic to \( F_q(x, y_1, y_2) \) defined by

\[
\begin{align*}
y_1^3 - y_1 &= x^{q_0}(x^q - x) \\
y_2^3 - y_2 &= x^{2q_0}(x^q - x)
\end{align*}
\]

where \( q_0 = 3^s \). This function field is itself optimal (i.e. \( F \) has as many \( \mathbb{F}_q \)-rational places as possible) and any constant field extension \( FF_{q^m} \) (where \( m \equiv 6 \mod 12 \)) is maximal (i.e. the number of \( \mathbb{F}_q \)-rational places attains the Hasse-Weil bound). In the present work we calculate the genera of nonrational subfields \( E \subseteq F \), by considering the fixed fields \( F^H \) under subgroups \( H \) of the automorphism group \( G \) of \( F \). If \( \mathbb{F}_q E \subseteq F \) then \( EF_{q^m} \) is also maximal. Thus we obtain many integers \( g \geq 0 \) that occur as the genus of some maximal function field over \( \mathbb{F}_q \) with \( q = 3^{2s+1} \) and \( m \equiv 6 \mod 12 \). A similar work has been carried out by A. Garcia, H. Stichtenoth and C. P. Xing for the Hermitian function fields case, in [Compositio Math. 120 137-170, 2000].
Cofinitely Supplemented Modules
H. Çalışci and A. Pancar
Department of Mathematics, Faculty of Education, Ondokuz Mayis University, 05189, Amasya-Turkey , Department of Mathematics, Faculty of Arts and Science, Ondokuz Mayis University, 55139, Samsun-Turkey
e-mail : hcalisici@omu.edu.tr, apancar@omu.edu.tr

For properties of supplemented and cofinitely supplemented modules see [1] and [5]. Let R be a ring with identity and M be a right R-module. A submodule N of M is called cofinite in M if the factor module is finitely generated. An R-module M is called cofinitely supplemented if every cofinite submodule of M has a supplement that is a direct summand of M. For any ring R, arbitrary direct sum of cofinitely supplemented R-modules is cofinitely supplemented. Let denote the sum of local submodules of M such that each of them is a direct summand of M. Then following statements are equivalent for a module M. 1. Every maximal submodule of M has supplement that is a direct summand of M. 2. does not contain a maximal submodule. If M has SSP [2] this is equivalent to: 3. M is cofinitely supplemented. It was shown in [3] that if M is supplemented module with (D3) then M is completely supplemented (i.e. every direct summand of M is supplemented). We prove an analogue of this fact. Let M be cofinitely supplemented module with (D3). Then every cofinite direct summand of M is cofinitely supplemented. A ring R is right perfect if and only if every free right R-module is supplemented [4]. An analogue for semiperfect ring is given in the following theorem. The following statements are equivalent for a ring R with identity. 1. R is semiperfect. 2. is cofinitely supplemented. 3. Every free R-module is cofinitely supplemented.

References

Quantifier Elimination and Geometry over Non-Archimedean Valued Fields
Yahn Firat Çelikler
Purdue University, Indiana USA
e-mail : ycelikler@math.purdue.edu

A theory T is said to admit Elimination of Quantifiers (∃, ∀) in a language L, if for any formula φ of L, there is a quantifier free formula ψ of L such that, in T, φ ↔ ψ is true. This is one of the key concepts in Model Theory with some interesting implications. After a brief introduction to concepts from Mathematical Logic, we will talk about various fields that admit Elimination of Quantifiers in various languages and applications of this to geometry over those fields. Finally I will discuss some theorems about Quantifier Elimination for Non-Archimedean Valued Fields (E.g. \( \mathbb{Q}_p \)-field of p-adic numbers), methods
involved in proving those theorems and further use of those methods in obtaining more results in geometry.

The Efficiency of Standard Wreath Product
Sinan Çevik
Balikesir University, Balikesir
e-mail: scevik@balikesir.edu.tr

Let $\xi$ be the set of all finite groups which have efficient presentations. In this paper we give sufficient conditions for the standard wreath product of two $\xi$-groups to be a $\xi$-group.

On Curves and Towers of Curves Over Finite Fields
Arnaldo García
IMPA at Rio de Janeiro, Brazil
e-mail: garcia@impa.br

We will survey on curves over finite fields with many rational points. Some of the topics:
1) Constructions of curves with many points.
2) Classification and equations of Maximal Curves; i.e., curves attaining the Hasse-Weil upper bound.
3) Towers of Curves and their limits (for the ratios of number of rational points by the genus).

Some Consequences of a Result on Artin-Schreier Families
Cem Güneri
Sabancı University, FENS, Orhanlı Tuzla 81474 Istanbul
e-mail: guneri@sabanciuniv.edu

Let $F$ be a characteristic $p > 0$ finite field and $m > 1$ be an integer. We consider families of Artin-Schreier curves of the form $ef = y^q - y = f(x)$, where $f(x)$ is a polynomial in $F_q[x]$. The number of affine $F_q^m$-rational points of a member in $ef$ is divisible by $q$ and at most equal to $q^{m+1}$; this is easy to see. Our result on $ef$ determines exactly when there is a nontrivial member with $q^{m+1}$ rational points in the family. We briefly go over the proof and this suffices to obtain some interesting corollaries. Then we look at how this result can be used in the weight enumerator analysis of 2-D cyclic codes. For this, we first represent a 2-D cyclic code as a trace code and relate codeword weights to the number of rational points of Arin-Schreier curves. Our result on $f$ allows us to write a general lower bound on the minimum distance of certain 2-D cyclic codes. We give examples where a better lower bound could be found and compute the complete weight enumerator for a class of 2-D cyclic.
Matrix Rings with SIP
Fatih Karabacak
Anadolu University, Eskişehir
e-mail: fkarabac@anadolu.edu.tr

A ring $R$ has SIP (SSP) if the intersection (sum) of two direct summands of $R$ is also a direct summand. We show that the right SIP (SSP) is the Morita invariant property. We also show that the trivial extension of $R$ by $M$ has SIP if and only if $R$ has SIP and $(1 - e)M e = 0$ for every idempotent $e$ in $R$. Moreover, we give necessary and sufficient conditions for the generalized upper triangular matrix rings to have SIP.

Random Matrices Over Finite Fields
Alexander A. Klyachko and Ibrahim Özen
Bilkent University Bilkent, 06533 Ankara Turkey
e-mail: iozen@fen.bilkent.edu.tr

Let $M_{n,k}$ be a $k \times n$ matrix over $\mathbb{F}_q$ with random, uniformly distributed elements, and $M_{I,J}$ be its submatrix spanned by set of rows $I$ and columns $J$. We are interested in distribution of ranks $r_{I,J} = \text{rank}(M_{I,J})$ and in correlation between the rank.

Let $C$ and $C^*$ be random codes with generator (respectively parity check) matrix $M_{n,k}$. Recall the definition of weight enumerator of code $C W_C(z) = \sum_i A_i z^{n-i} = \sum_I q^{n-r_I} (z - 1)^i$ where $A_i = \#\{c \in C : |c| = i\}$ and $r_I$ is rank of submatrix spanned by columns $I$. Applying theorem 1 to $W_C$, we get

Note that the covariance depends only on product $st$, which means that the coefficients of $W_C(z)$ are uncorrelated.

Recall MacWilliams duality $W_C^*(1 + z) = q^{-k} z^n W_C(1 + \frac{1}{z})$, which implies that for a self-dual code $C = C^*$ roots of $W_C(1 + z)$ are symmetric with respect to the circle $|z| = \sqrt{q}$.

Theorem 3 For $q > 9$ roots of the weight enumerator $W_C(1 + z)$ of a random self-dual code $C = C^*$ are almost surely on the circle $|z| = \sqrt{q}$ as $n, k \to \infty$.

To state a similar result for non-self-dual codes we need a slightly modified enumerator $\tilde{W}_C(u) = (u - 1)^n W_C(\frac{u - 1}{u})$.

Theorem 4 For $(q^k - 1)(q^{1-R} - 1) > 4$ roots of $\tilde{W}_C(u)$ are uniformly distributed near the circle $|u| = q^{1-R}$ as $n, k \to \infty$. Here $R = k/n$ is transmission rate.

The Metamorphosis of $\lambda$-fold Block Designs with Block Size Four into $\lambda$-fold Kite Systems
Selda Küçükçıçti
Koç University, Istanbul
e-mail: skucukci@ku.edu.tr

A kite is a triangle with a tail consisting of a single edge. A kite system of order $n$ is a pair $(X, K)$, where $K$ is a collection of edge disjoint kites which partitions the edge set of $K_n$ (the complete undirected graph on $n$ vertices) with vertex set $X$. Let $(X, B)$ be a block design with block size 4. If we remove a path of length 2 from each block in $B$, we obtain a partial kite-system. If the deleted edges can be assembled into kites the result is a kite-system, called a metamorphosis of the block design $(X, B)$. In this talk we
will introduce the metamorphosis problem for $\lambda$-fold block designs with block size 4 and concentrate on the case for kite systems. We will give a complete solution of the problem of determining all pairs $(\lambda, n)$ such that there exists a $\lambda$-fold block design of order $n$ with block size 4 having a metamorphosis into a $\lambda$-fold block design of order $n$ with block size 4 having a metamorphosis into a $\lambda$-fold kite system.

Linear codes over finite chain rings and sets of points in projective Hjelmslev planes
Ivan N. Landjev
Institute of Mathematics and Informatics
Bulgarian Academy of Sciences 8 Acad. G. Bonchev str. bl.8 1113 Sofia, BULGARIA
e-mail: ivan@moi.math.bas.bg

The geometric nature of certain optimality problems in coding theory has been long known. The geometric approach to such problems is based on the equivalence between linear codes over finite fields or chain rings and multisets of points in the corresponding projective geometries.

In this talk we start with geometric proofs for several results on optimal linear codes and discuss generalizations that arise from the geometric approach. These include theorems by Hill-Lizak, Dodunekov, and Ward.

A special attention is paid to a recent construction of maximal arcs in projective Hjelmslev planes which gives rise to a nice class of codes. Let $\Pi$ be a projective Hjelmslev plane over a chain ring $R$ of cardinality $q^2$ and nilpotency index 2, i.e. a ring with $R > R > (0)$ and $R/R \simeq F_q$. A $(k,2)$-arc in $\Pi$ is a set of points no three of which are collinear. Denote by $m_2(\Pi)$ the maximum possible cardinality of such arcs. It is known that $m_2(\Pi) = \begin{cases} q^2 + q + 1 & \text{for } q \text{ even;} \\ q^2 & \text{for } q \text{ odd.} \end{cases}$ We prove using Witt vectors that $(4^t + 2^t + 1,2)$-arcs do exist in projective Hjelmslev planes over Galois rings of order $4^t$ and characteristic 4. Such arcs do not exist for chain rings of characteristic 2.

Some Finitary Groups and Rings and Their Generalization
Vladimir M. Levchuk
Krasnoyarsk State University, Russia
e-mail: levchuk@lan.krasu.ru

For any chain $\Gamma$ the set of all $\Gamma$-matrices $\| a_{ij} \|_{i,j \in \Gamma}$ over any associative ring $K$ with identity having a finite number of non-zero elements in each row and column with respect to the usual matrix addition and multiplication forms a ring with identity. In this ring we consider the subring of all $\Gamma$-matrix with $a_{ij} = 0$ for $i \leq j$, its associated Lie ring and adjoint group. Also we consider generalizations as in [1] - [5]. The ring $NT(\Gamma, K)$ of all finitary $\Gamma$-matrices $\| a_{ij} \|$ over $K$ with zeros on and above the main diagonal is locally nilpotent and hence radical. If $R' = NT(\Gamma', K')$, $R = NT(\Gamma, K)$ and either $|\Gamma| < \infty$ or $K$ is a ring with no zero-divisors, then isomorphisms between rings $R$ and $R'$, their adjoint groups and also associated Lie rings are described.

References
On Minimal Codewords in Linear Codes
Nikolai Lazarov Manev
Bulgarian Academy of Sciences, Bulgaria
e-mail: nlmanev@moi.math.bas.bg

A nonzero codeword c of a linear code C is called minimal if its support does not contain
the support of another nonzero codeword as a proper subset.

The sets of minimal codewords of linear codes were first considered in connection
with constructing a decoding algorithm (Tai-Yang Hwang [HW]). Later they were used to
describe the minimal access structure in a linear secret-sharing scheme [Mas], [AB].

It seems to be quite difficult to describe the set of minimal codewords for an arbitrary
linear code and only few results have been obtained till now. Even the following simpler
(but natural) questions are generally without answers: For a given value of w, what part
of all codewords of weight w in a linear code C are minimal and for which w the set of
minimal codewords is nonempty?

Brief overview of the subject is presented. More attention is given to the following
results:

Let C be a cyclic binary code of block length n = 2^m - 1 generating by g(x) =
m_1(x)m_{2^m+1}(x), (s,m) = 1. This class of codes includes double-error correcting BCH
codes (s = 1). The cardinalities of the sets of minimal codewords of weights 10 and 11 in
C as well as of weight 12 in its extended code C are calculated. It is proved that some
classes of cyclic codes are intersecting.

The number of non-minimal codewords of weight 2d_min in the binary Reed-Muller
code RM(r,m)is computed. Also, it is proved that all codewords of weight greater than
2^m - 2^{m-r+1} in the binary RM(r,m), are non-minimal.

References
[AB] A. Ashikhmin, A. Barg, Minimal Vectors in Linear Codes, IEEE Trans. Inf. Theory,

[HW] Tai-Yang Hwang, Decoding linear block codes for minimizing word error rate, IEEE
Trans. on Information Theory, IT-25, 1979, 6, 733–737.

[Mas] J. Massey, Minimal Codewords and Secret Sharing, in Proc. Sixth Joint Swedish-
Minimal Groups of Finite Morley Rank
Ali Nesin
Bilgi University, Istanbul
e-mail : anesin@yahoo.com

A group of finite Morley rank is called minimal if all its connected definable and proper subgroups are solvable. It is thought that such groups are isomorphic to $PSL_2(K)$ for some algebraically closed field $K$. The talk will be centered about such groups. We will expose our current state of knowledge about such groups.

Artin-Schreier and Kummer Extensions of the Projective Line and Curves with Many Points
Mahmoud Shalalfeh (joint work with S. Stepanov)
Bilkent University, Ankara
e-mail : mahmoud@fen.bilkent.edu.tr

Let $F_q$ be a finite field with $q = p^n$ elements, $q$ is a power of a prime. We study algebraic function fields with full constant field $F_q$ given by generators $z_1, \ldots, z_r, y_1, \ldots, y_s$ and relations of the form

$$ y_i^p - y_i = f_i(x) \quad z_i^n = g_j(x) $$

where $n$ is a divisor of $q - 1$ and $f_i(x), g_j(x)$ are polynomials in the rational function field $F_q(x)$.

We compute the genus of these algebraic function fields using the genus formula for elementary abelian $p$-extensions given by Garcia and Stichtenoth. We give some special polynomials such that these function fields have many rational places of degree one compared to their genus.

Non-Hamming Rosenbloom-Tsfasman Metrigine Göre Galois Halkaları Üzerindeki Lineer Kodların Yapısı
Mehmet Özen
Matematik Bölümü, Sakarya Üniversitesi, Sakarya
e-mail: ozen@sakarya.edu.tr


Bu çalışmada ise, Galois halkaları üzerinde bu $\rho$ metriğine göre tanımlı kodlar için bir standart form matrisi tanımlandı ve bu standart formdan faydalanarak minimum uzaklığın nasıl hesaplanabileceği gösterildi. MDS olma şartları verildi. MDS kodlarının ağırlıklarını hesaplayan formüller bulundu. Bazı şartlar altında bazı devirli kodların MDS olduğu gösterildi.
Kaynaklar

Singular K3 surfaces as coverings of Enriques surfaces
Ali Sinan Sertöz
Bilkent University, Ankara
e-mail: sertoz@fen.bilkent.edu.tr

Every Enriques surface admits a K3 surface as its double cover. The converse however is not true. Works of Horikawa and Keum resulted in giving a lattice theoretical criterion for deciding when a K3 surface covers an Enriques surface. This criterion is not computable in general. Even when the Picard number of the K3 surface is 20, the Horikawa-Keum criterion presents challenges. We will report on this particular case and will report the following theorem: Let $X$ be a singular K3 surface with $T_X = \begin{pmatrix} 2a & c \\ c & 2b \end{pmatrix}$ being the intersection matrix of its trancendental lattice. Then $X$ covers an Enriques surface, or equivalently $X$ posseses a fixed point free involution, if and only if one of the following conditions hold:
I. $a$, $b$, and $c$ are even. (Keum's result).
II. $c$ is odd and $a, b$ is even.
III-1. $c$ is even. $a$ or $b$ is odd. The form $ax^2 + cxy + by^2$ does not represent 1.
III-2. $c$ is even. $a$ or $b$ is odd. The form $ax^2+cxy+by^2$ represents 1, and $4ab-c^2 \neq 4, 8, 16$. Equivalently, $X$ fails to doubly cover an Enriques surface if and only if one of the following conditions hold:
IV. $abc$ is odd.
III-3. $c$ is even. $a$ or $b$ is odd. The form $ax^2+cxy+by^2$ represents 1, and $4ab-c^2 = 4, 8, 16$. The proof of the above theorem surprisingly expands into the work of Vinberg on Lobachevski spaces, as will be reported.

On the lp Norms of Interval Cauchy-Toeplitz and Interval Cauchy-Hankel Matrices
Süleyman Solak, Ramazan Türkmen, Durmuş Bozkurt
Selçuk University, Konya
e-mail: ssolak@selcuk.edu.tr, rturkmen@selcuk.edu.tr, dbozkurt@selcuk.edu.tr
In this study, we have given theorems and corollaries concerning with the \( l_p \) norms of interval Cauchy-Toeplitz and interval Cauchy-Hankel matrices of forms:

\[
T_n^I = [T_n, T_n^*] \text{ and } H_n^I = [H_n, H_n^*]
\]

where

\[
T_n^I = \left[ \frac{1}{1/k + |i-j|} \right]_{i,j=1}^n, \quad T_n^* = \left[ \frac{1}{1/(k+r) + |i-j|} \right]_{i,j=1}^n
\]

and

\[
H_n^I = \left[ \frac{1}{1/k + |i+j|} \right]_{i,j=1}^n, \quad H_n^* = \left[ \frac{1}{1/(k+r) + |i+j|} \right]_{i,j=1}^n
\]

References

The Hermitian Function Field
Henning Stichtenoth
University of Essen, Germany
e-mail: stichtenoth@uni-essen.de

The Hermitian function field \( H = K(x, y) \) over a field \( K \) of characteristic \( p > 0 \) is defined by the equation \( x^{(q+1)} + y^{(q+1)} + 1 = 0 \), where \( q \) is some power of \( p \). This function field is very remarkable since it has some extremal properties. For example, for \( K \) being algebraically closed, \( H \) has the largest number of automorphisms among all function fields of the same genus. On the other hand, if \( K = GF(q^2) \) is the finite field of cardinality \( q^2 \), then \( H \) is the unique function field of genus \( q(q-1)/2 \) whose number of \( K \)-rational places attains the Hasse-Weil upper bound. This property makes \( H \) attractive for applications to coding theory.

Linear codes meeting the Griesmer bound and minihypers in finite projective spaces
L. Storme
Ghent University, Dept. of Pure Mathematics and Computer Algebra, Krijgslaan 281, 9000 Ghent, Belgium.
e-mail: l@eage.rug.ac.be, http://eage.rug.ac.be/~ls

A linear \([n, k, d; q]\) code \( C \) is a \( k \)-dimensional linear subspace of the vector space \( V(n, q) \) of dimension \( n \) over the finite field \( q \) of order \( q \) such that all codewords of \( C \) differ in at least \( d \) positions.

From an economical point of view, it is interesting to use linear codes having a minimal length \( n \) for given \( k, d \) and \( q \). The Griesmer bound states that if there exists a linear \([n, k, d; q]\) code for given values of \( k, d \) and \( q \), then \( n \geq \sum_{i=0}^{k-1} \left\lfloor \frac{d_i}{q^i} \right\rfloor = g_q(k, d) \), where \( \lfloor x \rfloor \) denotes the smallest integer greater than or equal to \( x \).
Considering this lower bound on the length \( n \) for given values \( k, d \) and \( q \), the question arises whether there exists a linear \([n,k,d;q]\) code whose length \( n \) is equal to the lower bound \( g_q(k,d) \). This coding-theoretical problem, which has been studied in great detail, was translated by Hamada and Tamari into a geometrical problem on \textit{minihypers in finite projective spaces}.

Strong results for general values of \( n, k, d \) and \( q \) on linear codes meeting the Griesmer bound were obtained by Hamada, Helleseth and Maekawa, precisely using this link with minihypers.

Recently, improvements to these results have been obtained by Ferret, Govaerts and Storme.

We explain the link between linear codes meeting the Griesmer bound and minihypers in finite projective spaces and give some ideas how the characterization results on linear codes meeting the Griesmer bound, of Hamada, Helleseth and Maekawa, and Ferret, Govaerts and Storme, were obtained.

---

**A MacWilliams Type Identity**

Irfan Şiap

Adıyaman Education Faculty, Gaziantep University

e-mail: isiap@gantep.edu.tr

Recently, a new non-Hamming metric for linear spaces of matrices over fields has been introduced. MacWilliams identity for these linear codes was shown to hold for orbits of these linear spaces that are invariant under this metric. Later, a \( \rho \) complete weight enumerator for these codes is defined and a MacWilliams identity for \( \rho \) complete weight enumerator of linear spaces of matrices with entries from a field is proved. Also very recently, \( \rho \) complete weight enumerator and the MacWilliams identity for linear spaces of matrices with entries from a Galois ring is proved. Here, we prove the MacWilliams identity of \( \rho \) complete weight enumerator for linear spaces of matrices with entries from \( F_q + uF_q \) where \( u^2 = 1 \).

---

**The Classification Problem for p-local Torsion-Free Abelian Groups of Finite Rank**

Simon Thomas

Rutgers University, USA

e-mail: sthomas@math.rutgers.edu

Fix some integer \( n > 2 \) and some prime \( p \). In this talk, I will use Zimmer's superrigidity theorem and Ratner's measure classification theorem to prove that the classification problem for \( p \)-local torsion-free abelian groups of rank \( n \) is strictly easier than the classification problem for arbitrary torsion-free abelian groups of rank \( n \).
On Computer Proof of Some Results about Sporadic Simple Groups of Finite Orders
Alexey V. Timofeenko
Krasnoyarsk University, Russia
e-mail: a.v.timofeenko62@mail.ru

This lecture presents an algorithm for the computation of the set of generating triples of involutions in a finite group. The algorithm has been implemented by author in GAP (Group, Algorithms and Programming). One of consequences of this calculations and application of results of B. L. Abasheev and S. Norton for Monsters $B$, $M$ is a next

Theorem. The sporadic simple finite groups generated by three involutions, two of which commute, except for the MacLaughlin group $M_{23}$ and Mathieu groups $M_{11}$, $M_{22}$ and $M_{23}$. (See V. D. Mazurov’s problem 7.30 from “The Kourovka Notebook”.)

Author proof also, that each element of Janko groups $J_1$ and $J_2$ is equal to product of two its involutions (The finish of A. I. Sozutov’s problem 14.82 from “The Kourovka Notebook” for sporadic simple finite groups).

On the automorphism groups of free nilpotent groups
Vladimir Tolstykh
Department of Mathematics, Istanbul Bilgi University, Istanbul Turkey
e-mail: tvlaa1@yahoo.com

A long-standing problem posed by Baumslag asks whether the automorphism tower over a torsion-free nilpotent group terminates after finitely many steps. So far one of the most significant contribution to that problem had been made in a paper by Dyer and Formanek of 1975 [DFo] in which they proved that the automorphism group of a finitely generated free nilpotent group $N$ of class two is complete except for the case, when $N$ is one- or three-generator. The main result of [To] states that the automorphism group of an infinitely generated nilpotent group of class two is also complete. Hence, in general, the automorphism tower over a free nilpotent group of class two is of height one (according to [DFo], the automorphism tower over a three-generator free nilpotent group is of height two).

Recently Formanek calculated the centers of the automorphism groups of finitely generated free nilpotent groups [Fo]. These results along with the following theorem give a possibility to attack the Baumslag’s problem for the case of free nilpotent groups.

Theorem. Let $N$ be a free nilpotent group. Then group of inner automorphisms of $N$ is a characteristic subgroup of $\text{Aut}(N)$.

References
Representation Theory of Local Rings
Roger Wiegand
University of Nebraska-Lincoln, USA
e-mail: rwiegand@math.unl.edu

Let R be a commutative Noetherian local Cohen-Macaulay ring of dimension d. Recall that a maximal Cohen-Macaulay module (MCM for short) is a finitely generated R-module of depth d. We say that R has finite CM type provided there are, up to isomorphism, only finitely many indecomposable MCM R-modules. More generally, R has bounded CM type provided there is a bound on the multiplicities of the MCM R-modules. We will give a survey of the main results on rings of finite CM type and also describe some recent results on bounded CM type.

Examples of integral domains in power series rings
Sylvia Wiegand
Univ. of Nebraska, USA
e-mail: swiegand@math.unl.edu

William Heinzer
Purdue Univ., USA

Christel Rotthaus
Michigan State Univ., USA

We describe some Noetherian and non-Noetherian integral domains inside the completion (a power series ring) of a standard Noetherian domain, such as polynomials over a field.

A new notion of rank for finite supersolvable groups and free linear actions on products of spheres
Ergun Yalcin
Joint with: Laurence Barker (Bilkent Universitesi)
Bilkent University, Ankara
e-mail: yalcine@fen.bilkent.edu.tr

For a finite supersolvable group G, we define the saw rank of G to be the minimum number of sections $G_k - G_{k-1}$ of a cyclic normal series $G_s$ such that $G_k - G_{k-1}$ owns an element of prime order. The axe rank of G, studied by Urmie Ray, is the minimum number of spheres in a product of spheres admitting a free linear action of G. Extending a question of Ray, we conjecture that the two ranks are equal. We prove the conjecture in some special cases, including that where the axe rank is 1 or 2. We also discuss some relations between our conjecture and some questions about Bieberbach groups and free actions on tori.
On the Bounds for the Norms of Almost FToeplitz Matrices
A. Yalçiner and N. Taskara
Department of Mathematics, Selcuk University, Konya
e-mail: ayalciner@selcuk.edu.tr
e-mail: ntaskara@selcuk.edu.tr

In this study, we have given the definition of almost FToeplitz matrix. Then, we have obtained an upper and lower bounds for the spectral norm of this matrix. Moreover, we have obtained an upper and lower bounds for the spectral norm of Filbert matrix.
Antalya Algebra Days IV - List of Talks

22.05.2002 Wednesday
10:00-10:50 Henning Stichtenoth The Hermitian function field
Coffee Break
11:20-12:10 Sinan Sertöz Singular K3 surfaces as coverings of Enriques surfaces
Lunch Break
16:00-16:50 Vladimir Lechuck Finitary rings, their generalizations and adjoint groups
Coffee Break
Session I
17:20-17:50 Cem Güneri Some consequences of a result on Artin-Schreier families
17:50-18:20 Irfan Şiap A MacWilliams type identity
Session II
17:20-17:50 Fatih Karabacak Matrix rings with the summand intersection property
17:50-18:20 Engin Büyükaşık Cofinitely weak supplemented modules
Welcome Reception

23.05.2002 Thursday
9:00-9:50 Arnaldo Garcia On curves and towers of curves over finite fields
Coffee Break
10:00-10:50 Sylvia Wiegand Examples of integral domains in power series rings
Lunch Break
11:20-12:10 Emrah Çakçak Subfields of the function fields of Deligne-Lusztig curves associated to Ree groups
Coffee Break
16:00-16:50 Roger Wiegand Representation theory of local rings
Session I
17:20-17:50 Vladimir Tolstykh On the automorphism groups of free nilpotent groups
17:50-18:20 Ahmet Sinan Çevik The efficiency of standard wreath product
18:20-18:50 Ergün Yalçın A new notion of rank for finite supersolvable groups and free linear actions on products of spheres
Session II
17:20-17:50 Nurcan Arıg On centroid and extended centroid of rings
17:50-18:20 Rafael Alizade Homological aspects of supplements and complements
18:20-18:50 Hamza Çalışıcı Dual sonlu tütenmiş modüller

24.05.2002 Friday
9:00-9:50 J. B. Carrell Singularities of Schubert varieties
10:00-10:50 Ivan Landjev Linear codes over finite chain rings and sets of points in finite projective geometries
Coffee Break
11:20-12:10 Mahmoud Shalaleh Artin-Schreier and Kummer extensions and curves with many points
Trip

25.05.2002 Saturday
9:00-9:50 Ali Nesin Minimal groups of finite Morley rank
Coffee Break
10:00-10:50 Alex Timofeenko On computer proof of some results about sporadic simple groups of finite orders
11:20-12:10 Nikolai Manev On the minimal codewords in linear codes
Lunch Break
12:10-13:00 Alexander Sopin
13:00-14:00 Gregory Cherlin
14:00-15:00 Boris Kunyavskii
15:00-16:00 Simon Thomas The classification problem for p-local torsion-free abelian groups of finite rank
Coffee Break
Session I
17:20-17:50 Selda Küçükçiftçi The metamorphosis of λ-fold block designs with block size four into λ-fold kite systems
17:50-18:20 Ibrahim Özen Random matrices over finite fields
18:20-18:50 Mehmet Ozen Non-Hamming (Rosenbloom-Tsfasman) metriğine göre Galoist halkaları üzerindeki lineer kodların yapısı
Session II
17:20-17:40 Ayner Yalçın On the Bounds for the Norms of Almost FTeoplitz Matrices
17:40-18:00 Süleyman Soğak On the 1_p Norms of Interval Cauchy-Toeplitz and Interval Cauchy-Hankel Matrices
18:00-18:20ERCAN ALTINŞİKL GCD ve LCM Matrislerinin Normal Uzerine
18:20-18:50 Yalin Firat Çelikler Quantifier elimination and geometry over non-Archimedean fields

26.05.2002 Sunday
9:00-9:50 Leo Storme Linear codes meeting the Griesmer bound and minihypers in finite projective spaces
10:00-10:50 Tom Albu Abstract cogalois theory for profinite groups
Coffee Break
11:20-12:10 Lucian Badescu Extending formal functions in algebraic geometry. Applications
Lunch and farewell till next year!