Algebraic and Combinatorial Approaches to Designs and Codes - Part II
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JIM DAVIS, University of Richmond, VA
Designs with the Symmetric Difference Property

The recently completed search for existence of difference sets in small 2-groups has provided a wealth of data to explore other questions. One classical question asks which designs have the symmetric difference property (the symmetric difference of any three blocks is either a block or the complement of a block). We show in this talk that the groups $C_8 \times C_4^t \times C_2$ all have difference sets whose designs have the symmetric difference property, $t \geq 1$, and that these designs are nonisomorphic to the symplectic designs. Joint with Smith, Hoo, Kissane, Liu, Reedy, Sharma, and Sun.

HADI KHARAGHANI, University of Lethbridge
A class of balanced weighing matrices and the corresponding association scheme

Balanced weighing matrices with parameters

$$\left(1 + 18 \cdot \frac{9^{m+1} - 1}{8}, 9^{m+1}, 4 \cdot 9^m\right),$$

for each nonzero integer m is constructed. This seems to be the first infinite class not belonging to those with classical parameters. It is shown that any balanced weighing matrix is equivalent to a five-class association scheme.

This is joint work with Thomas Pender and Sho Suda.

ZEYING WANG, Michigan Technological University, MI
New necessary conditions on (negative) Latin square type partial difference sets in abelian groups

A partial difference sets (in short, PDS) with parameters (n^2, $r(n-\epsilon)$, $\epsilon n + r^2 - 3\epsilon r$, $r^2 - \epsilon r$) is called a $Latin\ square\ type$ PDS if $\epsilon = 1$ (respectively, a $negative\ Latin\ square\ type$ PDS if $\epsilon = -1$). Recently we obtained some restrictions on the parameter r of a (negative) Latin square type partial difference set in an abelian group of order a^2b^2, where $\gcd(a, b) = 1$, $a > 1$, and b is an odd positive integer ≥ 3. As far as we know no previous general restrictions on r were known. Our restrictions are particularly useful when a is much larger than b.

IAN WANLESS, Monash University, Australia
Omniversal Latin squares

A partial transversal of a Latin square is a set of entries in which no row, column or symbol is repeated. It is maximal if it is not contained in a larger partial transversal. A Latin square of order n is omniversal if it possesses a maximal partial transversal of every size from $\lceil \frac{n}{2} \rceil$ to n. We show that omniversal Latin squares exist iff $n \not\equiv 2 \bmod 4$ and $n \notin \{3, 4\}$. We also show that group tables are very far from omniversal (as are random Latin squares). In the process we encounter an interesting problem in combinatorial group theory.

XIANDE ZHANG, University of Science and Technology of China
Optimal ternary constant weight codes in l_1-metric

In this talk, we discuss our recent progress on the existence of optimal ternary constant weight codes in l_1-metric. We determine the maximum size of ternary codes of constant weight w and distance $2w - 2$ for all large length n. For distance $2w - 4$,

we determine the coefficients of n^2 by constructing asymptotially optimal codes. The motivation of studying constant weight codes in l_1-metric is from data storage in live DNA.