Designs and Codes I

(Org: **Peter Dukes** (University of Victoria), **Esther Lamken** (California Institute of Technology) and/et **John van Rees** (University of Manitoba))

JEFF DINITZ, University of Vermont
Constructions for Retransmission Permutation Arrays

A recently introduced technique for resolving overlapping channel transmissions uses an interesting new type of combinatorial structure. We define a class of combinatorial structures, which we term "Retransmission Permutation Arrays" (or RPA's), that generalize the model. These RPA's turn out to be arrays that are row latin and satisfy an additional property in each of the top two corners. We show that RPA's exist for all possible orders and define some extensions having additional properties.

CLEMENT LAM, Concordia University
A computer search for Projective Hjelmslev Planes of order 9

A projective Hjelmslev plane of order 9 is a symmetric group divisible design $GDD(9, 13, 12; 3, 1)$ whose dual is also a $GDD(9, 13, 12; 3, 1)$. Several examples are known. This talk reports some ongoing work of a computer search to find more.

BRETT STEVENS, Carleton University
Covering designs and Matroids

Motivated by a robust communication model we are interested in covering designs with the restriction that the blocks must simultaneously be bases of a given matroid. A base in a matroid can never contain a circuit from the matroid because bases are maximally independent sets and circuits are minimally dependent sets. Thus the size of a minimum circuit bounds the possible strength of such a covering design. We investigate examples of such covering designs.

DOUG STINSON, University of Waterloo
A Unified Approach to Combinatorial Key Predistribution Schemes for Sensor Networks

There have been numerous recent proposals for key predistribution schemes for wireless sensor networks based on various types of combinatorial structures such as designs and codes. We provide a unified framework to study these kinds of schemes. We derive general formulas for the metrics of the resulting key predistribution schemes that can be evaluated for a particular scheme simply by substituting appropriate parameters of the underlying combinatorial structure.

This is joint work with Maura Paterson.

JOHN VAN REES, U. of Manitoba
3-Uniform Friendship Hypergraphs

3-Uniform Friendship Hypergraphs by C. P. (Ben) Li, N. Singhi and G.H.J. van Rees

Sos defined the friendship property for 3-uniform hypergraphs. For every three vertices, x, y and z there exists a unique vertex w such that xyw, yzw and xzw are all edges in the 3-hypergraph. We improve the bounds on 3-uniform friendship hypergraphs. We prove that the 3 known hypergraphs on 16 points are geometrical and that there are no others.