Graduate Seminar in Mathematics

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Cyclic Block Designs with Block Size 3 from Skolem-Type Sequences

Abstract:

A Skolem-type sequence is a sequence $(s_1, \ldots, s_t)$ of positive integers $i \in D$ such that for each $i \in D$ there is exactly one $j \in \{1, \ldots, t-1\}$ such that $s_j = s_{j+i} = i$. Positions in the sequence not occupied by integers $i \in D$ contain null elements. In 1939, Peltesohn solved the existence problem for cyclic Steiner triple systems for $v \equiv 1, 3 \pmod 6$, $v \neq 9$. Using the same technique in 1981, Colbourn and Colbourn extended the solution to all admissible $\lambda > 1$.

It is known that Skolem-type sequences may be used to construct cyclic Steiner triple systems as well as cyclic triple systems with $\lambda = 2$. The main result of this talk is an extension of former results onto cyclic triple systems with $\lambda > 2$. In addition we introduce a new kind of Skolem-type sequence.

This is joint work with my supervisor, Dr N. Shalaby.