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.