The full metamorphosis of λ-fold block designs with block size four

E. Şule Yazıcı
Koç University
eyazici@ku.edu.tr

(joint work with Selda Küçükçifçi)

First we give a review of the full metamorphosis problem of block designs with block size 4 into its subgraphs. This work studies the full metamorphosis of block designs with block size 4 into kite systems. Let (X, B) be a λ-fold block design with block size 4. If a path of length two is removed from each block of B the resulting collection of kites K is a partial λ-fold kite system (X, K). If the deleted edges can be arranged into a collection of kites D, then $(X, K \cup D)$ is a λ-fold kite system. Now for each block $b \in B$ let $\{P_1(b), P_2(b), P_3(b)\}$ be a partition of b into paths of length two and define for *each* $i = 1, 2, 3$, sets K_i and D_i as follows: for each $b \in B$, put the kite $b \setminus P_i(b)$ in K_i and the two edges belonging to the path $P_i(b)$ in D_i. If the edges in D_i can be arranged into a collection of kites D_i^* then $M_i = (X, K_i \cup D_i^*)$ is a λ-fold kite system, called the ith metamorphosis of (X, B). The *full metamorphosis* is the set of three metamorphoses $\{M_1, M_2, M_3\}$. We give a complete solution of the following problem: for which n and λ does there exist a λ-fold block design with block size 4 having a full metamorphosis into a λ-fold kite system?