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Perfect Sequence Covering Arrays: A Group-Based Approach

Consider a set P of permutations of $[n] = \{1, 2, \dots, n\}$, viewed as a set of ordered n -tuples. Assume that every ordered k -subsequence of distinct elements from $[n]$ appears exactly λ times across the permutations in P . What is the minimum possible size of P ? This natural question connects to directed t -designs, perfect deletion-correction codes, k -rankwise independent families of permutations, and a recent resurgence motivated by the introduction of perfect sequence covering arrays by Raphael Yuster. This talk presents recent progress on this problem, with an emphasis on a common group-based structure observed in certain perfect sequence covering arrays identified through sophisticated computer search.

This talk is based on joint work with Jonathan Jedwab and Jingzhou Na (Simon Fraser University).