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A strong external difference family with more than two subsets

Strong external difference families (SEDFs) were introduced by Paterson and Stinson as a more restrictive version of external difference families. SEDFs can be used to produce optimal strong algebraic manipulation detection codes. We characterize the parameters (v, m, k, λ) of a nontrivial SEDF that is near-complete (satisfying $v = km + 1$). We construct the first known nontrivial example of a (v, m, k, λ) SEDF having $m > 2$ subsets. The parameters of this example are $(243, 11, 22, 20)$, giving a near-complete SEDF, and its group is $\mathbb{Z}_3^5$. The construction uses the point-orbits of the Mathieu group M_{11} acting on the projective geometry PG$(4, 3)$.

This is joint work with Shuxing Li, Simon Fraser University.