On difference matrices with respect to cosets

(joint work with C. Suetake)

Yutaka Hiramine

Kumamoto University, Japan

Abstract. Let U be a group of order u and let k and λ be positive integers. A $k \times u\lambda$ matrix $H = [h_{ij}]$ is called a $(u, k; \lambda)$-difference matrix over U if $h_{ij} \in U$ $(\forall i, j,\ 1 \leq i \leq k,\ 1 \leq j \leq u\lambda)$ and satisfies the following:

$$\sum_{1 \leq j \leq u\lambda} h_{ij} {h_{\ell j}}^{-1} = \lambda \widehat{U} \in Z[U] \quad (1 \leq i \neq \ell \leq k).$$

A $(u, u\lambda; \lambda)$-difference matrix is a $\mathrm{GH}(u, \lambda)$ matrix over U and is also called a $\mathrm{GH}(u\lambda, U)$ matrix.

In this talk we consider a $(u, k; \lambda)$-difference matrix having a row $w \neq (1, \cdots, 1)$ such that the product rw is also a row of H for any row r of H. We call such a matrix a difference matrix of coset type with respect to w. We prove that if u is a prime and $\lambda > 1$, then H is equivalent to a difference matrix constructed from smaller difference matrices. Moreover, we construct several examples of difference matrices of coset type.