

Balanced Weighing Matrices and Association Schemes

Thomas Pender

A weighing matrix is a square $(-1, 0, +1)$ -matrix with pairwise orthogonal rows such that each row has a constant number of non-zero entries. If upon taking the absolute values of all the entries of a weighing matrix, one obtains an incidence matrix for a symmetric balanced incomplete block design, we say that the weighing matrix is balanced.

In this talk, we construct a new infinite family of balanced weighing matrices. We then show a novel characterization of balanced weighing matrices using association schemes. Finally, we explore analogous relations between more general classes of objects: balanced generalized weighing matrices, quasi-balanced weighing matrices.

This is joint work with Dr. Hadi Kharaghani (University of Lethbridge) and Dr. Sho Suda (National Defense Academy of Japan).