Constructing Resolutions for an Infinite Family of Bose Triple Systems

Dylan Lusi*, Charles Colbourn, Arizona State University

A classical construction of Bose produces a Steiner triple system of order $3n$ from a specific quasigroup of side n whenever n is odd. In an application to access-balancing in storage systems, these Bose triple systems play a central role. In that context, a natural question arises: When are the Bose triple systems resolvable? An elementary counting argument shows that the Bose triple system of order $3n$ cannot be resolvable when $n \equiv 1, 5 \pmod 6$. When $n = 3s$, a resolution of the Bose triple system of order $3n$ can be produced from a partition of the off-diagonal cells of the Bose quasigroup on $\{0, \ldots, 3s-1\}$ into classes of size s in which each $r \in \{0, \ldots, 3s-1\}$ appears once as a row, column, or symbol. In this talk, the existence of such a partition is shown whenever $n = 3p$ for p an odd prime, and the extension to all $n \equiv 3 \pmod 6$ is briefly discussed.

Keywords: Steiner triple systems, Kirkman triple systems, Bose construction, Access-balancing