New Lower Bounds on the Maximum Number of Mutually Orthogonal Steiner Triple Systems

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Two Steiner triple systems (STS) of order n are said to be orthogonal if their sets of triples are disjoint, and two disjoint pairs defining intersecting triples in one system fail to do so in the other. Define the quantity $\sigma(n)$ as the size of a maximal collection of pairwise orthogonal STS of order n. In this talk, it will be shown how special starters in the finite fields can be used to improve the best known lower bounds on $\sigma(n)$ for prime-powers $n \equiv 1 \pmod 6$. It will also be mentioned that imposing 3-cyclic automorphisms and using a standard hill-climb gives $\sigma(n) \geq 3$ for certain small values of $n \equiv 3 \pmod 6$. By some earlier work of Gross, asymptotic existence for three mutually orthogonal STS will follow. This is joint work with Dr. Jeff Dinitz.