Combinatorial designs: man versus machine

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We give an overview of construction of combinatorial designs using tactical decomposition. Equations for coefficients of tactical decomposition matrices of 2-designs are well-known. This system of equations for coefficients of tactical decomposition matrices represents necessary conditions for the existence of 2-designs with an assigned automorphism group. These equations have been used for computational construction of many examples of 2-designs. In this talk, we generalize these equations and propose an explicit equation system for coefficients of tactical decomposition matrices for t-designs, for any integer value of t. We extend these results to tactical decomposition matrices of designs over finite fields. We give insight into the problems we encountered as well as results we obtained.