Symbolic computation for orthogonal designs

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We present the construction of an algebraic system that models properties of complementary sequences, i.e. sequences with zero autocorrelation function. This way we can apply tools from symbolic computation, i.e., Groebner bases, to algorithmically treat complementary sequences.

Our goal is to obtain an effective (algorithmic) version of the reverse of the celebrated Equating/Killing Lemma in the theory of orthogonal designs.

In particular, given a set of complementary sequences of type $(s_1,s_2,\ldots,s_k)$, we show how to compute a new set of complementary sequences of type $(s_1,s_2,...,s_{i-1},a,b,s_{i+1},...,s_k)$ and another set of complementary sequences of type $(s_1,s_2,...,s_k,s_{k+1})$ (if possible, otherwise decide it is impossible).

This approach seems promising, since the algorithms derived from the proposed framework are able to solve some previously unresolved cases of orthogonal designs.