

## New light on certain two level designs using Gröbner bases

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### **Abstract**

Algebraic geometry can be used to solve identifiability problems in design of experiments as modern computational algebra packages such as Maple or CoCoA can be used. The point is that we regard the design as a set of polynomial solutions. Then, the Gröbner base theory allows one to identify the whole set of estimable effects (main or interactions) of the factors of the design. In this paper we applied Gröbner base theory in certain two level factorial designs.

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*Keywords and phrases* : Gröbner basis, Hadamard matrices, inequivalent projections, ideals, leading terms, divisibility condition, distinct runs.

### **1. Introduction**

In the early stages of an experimental situation, a large number of factors is likely to have been identified as possibly having an influence on the response. However, it is believed that only a few of these actually have a substantial effect, a situation known as factor sparsity. The small number of active factors can be identified through a screening experiment. Screening designs are frequently used by experimenters to help understand the impact of a large number of factors in relatively few trials. Traditionally Hadamard matrices have been studied for this purpose.

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