Minimal average degree aberration and the state polytope for experimental designs

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Abstract For a particular experimental design, there is interest in finding which polynomial models can be identified in the usual regression set up. The algebraic methods based on Gröbner bases provide a systematic way of doing this. The algebraic method does not, in general, produce all estimable models but it can be shown that it yields models which have minimal average degree in a well-defined sense and in both a weighted and unweighted version. This provides an alternative measure to that based on "aberration" and moreover is applicable to any experimental design. A simple algorithm is given and bounds are derived for the criteria, which may be used to give asymptotic Nyquist-like estimability rates as model and sample sizes increase.

Keywords Corner cut · Design ideal · Factorial design · Latin hypercube sampling · Linear aberration · State polytope