FRACTIONAL FACTORIAL DESIGNS WITH ADMISSIBLE SETS OF CLEAR TWO-FACTOR INTERACTIONS

by

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ABSTRACT

We consider the problem of selecting two-level fractional factorial designs that allow joint estimation of all main effects and some specified two-factor interactions (2fi’s) without aliasing from other 2fi’s. This problem is to find, among all $2^{m-p}$ designs with given $m$ and $p$, those resolution IV designs whose sets of clear 2fi’s contain the specified 2fi’s as subsets. A 2fi is clear if it is not aliased with any main effect or any other 2fi. We use a linear graph to represent the set of clear 2fi’s for a resolution IV design, where each line connecting two vertices represents a clear 2fi between the two vertices. We call a $2^{m-p}$ resolution IV design admissible if its graph is not a real subgraph of any other graphs of $2^{m-p}$ resolution IV designs. We show that all even resolution IV designs are inadmissible. In fact, the number of admissible designs is much smaller than the number of non-isomorphic designs. This leads to a concise catalog of all admissible designs of 32 and 64 runs. We also use an algorithm to determine all admissible 128-run resolution IV designs, but only provide some representative designs here.