$E(\chi^2)$-optimal Mixed-level Supersaturated Designs

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Abstract: This paper introduces an optimal criterion for mixed-level supersaturated designs, called $E(\chi^2)$, which covers $E(s^2)$ for two-level designs and $ave(\chi^2)$ for symmetrical designs as two special cases. Some lower bounds of $E(\chi^2)$ are obtained. Furthermore, it is shown that $E(\chi^2)$ criterion coincides with other existing criteria for nonregular mixed-level fractional actorial designs, which include generalized minimum aberration, minimum moment aberration, discrete uniformity and design efficiency. Several classes of $E(\chi^2)$-optimal mixed-level supersaturated designs from saturated orthogonal arrays are given.