



## $E(s^2)$ - and $UE(s^2)$ -Optimal Supersaturated Designs

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Supersaturated designs are useful for factor screening experiments under the factor sparsity assumption that only a small number of factors are active. The popular  $E(s^2)$ -criterion for choosing two-level supersaturated designs minimizes the sum of squares of the entries of the information matrix over the designs in which the two levels of each factor appear the same number of times. Jones and Majumdar (2014) proposed the  $UE(s^2)$ -criterion which is essentially the same as the  $E(s^2)$ -criterion except that the requirement of factor-level balance is dropped. We compare  $UE(s^2)$ -optimal designs and the traditional  $E(s^2)$ -optimal designs based on the average efficiencies over lower-dimensional projections. Since the requirement of level-balance is bypassed, usually there are many  $UE(s^2)$ -optimal designs with diverse performances when other things are considered. Jones and Majumdar (2014) mentioned the maximization of the number of level-balanced factors as a possible secondary criterion. We show by example that this is not an appropriate secondary criterion from a projective point of view and propose an alternative criterion. We also identify several families of designs that are both  $E(s^2)$ - and  $UE(s^2)$ -optimal.

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