An algorithmic approach to constructing mixed-level orthogonal and near-orthogonal arrays

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Abstract: Due to run size constraints, near-orthogonal arrays (near-OAs) and supersaturated designs, a special case of near-OA, are considered good alternatives to OAs. This paper shows (i) a combinatorial relationship between a mixed-level array and a non-resolvable incomplete block design (IBD) with varying replications (and its dual, a resolvable IBD with varying block sizes); (ii) the relationship between the criterion E (d^2) proposed by Lu and Sun [Lu, X., Sun, Y., 2001. Supersaturated designs with more than two levels. Chinese Ann. Math. B 22, 183-194] or E ($f_{N O D}$) proposed by Fang et?al.?[Fang, K.T., Lin, D.K.J., Liu, M.Q., 2003b. Optimal mixed-level supersaturated design. Metrika 58, 279-291] used in the (near-) OA construction and the (M, S)-optimality criterion used in the IBD construction; (iii) the derivation of a tighter bound for E (d^2); (iv) how to modify the IBD algorithm of Nguyen [Nguyen, N.-K., 1994. Construction of optimal incomplete block designs by computer. Technometrics 36, 300-307] to obtain efficient (near-) OA algorithms. Some new (near-) OAs are presented and some near-OAs are compared with arrays constructed by other authors. Examples showing the use of the constructed arrays are given. ?? 2008 Elsevier B.V. All rights reserved.

Index Keywords: (n-1) criterion; Algorithmic approach; Block designs; Block sizes; Orthogonal arrays (OA); Size constraints; Supersaturated designs

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