

Zhao, Shengli; Chen, Xiangfei

Mixed two- and four-level fractional factorial split-plot designs with clear effects. (English)

Zbl 1238.62089

J. Stat. Plann. Inference 142, No. 7, 1789-1793 (2012).

Summary: Mixed-level designs have become widely used in practical experiments. When the levels of some factors are difficult to be changed or controlled, fractional factorial split-plot (FFSP) designs are often used. It is important to know when a mixed-level FFSP design with resolution III or IV has clear effects. This paper investigates the conditions of a resolution III or IV FFSP design with both two-level and four-level factors to have various clear factorial effects, including two types of main effects and three types of two-factor interaction components. The structures of such designs are shown and illustrated with examples.

MSC:

62K15 Factorial statistical designs

Cited in 1 Review
Cited in 8 Documents

Keywords:

resolution; whole-plot factor; sub-plot factor

Full Text: DOI

References:

- [1] Addelman, S., Orthogonal main-effect plans for asymmetrical factorial experiments, *Technometrics*, 4, 21-46, (1962) · Zbl 0116.36704
- [2] Ai, M.Y.; Zhang, R.C., 2^{n-m} designs containing clear main effects or clear two-factor interactions, *Statistics & probability letters*, 69, 151-160, (2004) · Zbl 1062.62143
- [3] Bingham, D.; Sitter, R.R., Some theoretical results for fractional split-plot designs, *Annals of statistics*, 27, 1240-1255, (1999) · Zbl 0957.62065
- [4] Bisgaard, S.; Steinberg, D.M., The design and analysis of 2^{k-p} prototype experiments, *Technometrics*, 39, 52-62, (1997) · Zbl 0869.62069
- [5] Chen, B.J.; Li, P.F.; Liu, M.Q.; Zhang, R.C., Some results on blocked regular 2-level fractional factorial designs with clear effects, *Journal of statistical planning and inference*, 136, 4436-4449, (2006) · Zbl 1099.62082
- [6] Chen, H.; Hedayat, A.S., 2^{n-m} designs with resolution III and IV containing clear two-factor interactions, *Journal of statistical planning and inference*, 75, 147-158, (1998) · Zbl 0938.62081
- [7] Hedayat, A.; Pu, K.; Stufken, J., On the construction of asymmetrical orthogonal arrays, *Annals of statistics*, 20, 2142-2152, (1992) · Zbl 0784.62076
- [8] Huang, P.; Chen, D.; Voelkel, J., Minimum aberration two-level split-plot designs, *Technometrics*, 40, 314-326, (1998) · Zbl 1064.62552
- [9] Mukerjee, R.; Fang, K.T., Fractional factorial split-plot designs with minimum aberration and maximum estimation capacity, *Statistica sinica*, 12, 381-397, (2002)
- [10] Tang, B.; Ma, F.; Ingram, D.; Wang, H., Bounds on the maximum number of clear two-factor interactions for 2^{m-p} designs of resolution III and IV, *Canadian journal of statistics*, 30, 127-136, (2002) · Zbl 0999.62059
- [11] Wu, C.F.J., Construction of 2^{m-4n} designs via a grouping scheme, *Annals of statistics*, 17, 1880-1885, (1989) · Zbl 0695.62198
- [12] Wu, C.F.J.; Chen, Y., A graph-aided method for planning two-level experiments when certain interactions are important, *Technometrics*, 34, 162-175, (1992)
- [13] Wu, C.F.J.; Zhang, R.C.; Wang, R.G., Construction of asymmetrical orthogonal arrays of the type $\text{OA}(s^k, (s^{r_1})^{n_1} \dots (s^{r_l})^{n_l})$, *Statistica sinica*, 2, 203-219, (1992)
- [14] Yang, G.J.; Liu, M.Q., A note on the lower bounds on maximum number of clear two-factor interactions for 2_{III}^{m-p} and 2_{IV}^{m-p} designs, *Communications in statistics—theory and methods*, 35, 849-860, (2006) · Zbl 1093.62073
- [15] Yang, G.J.; Liu, M.Q.; Zhang, R.C., Weak minimum aberration and maximum number of clear two-factor interactions in

- $2_{\{IV\}}^{m-p}$ designs, Science in China (series A), 48, 1479-1487, (2005) · [Zbl 1112.62076](#)
- [16] Yang, J.F.; Li, P.F.; Liu, M.Q.; Zhang, R.C., $2^{\{(n_1 + n_2) - (k_1 + k_2)\}}$ fractional factorial split-plot designs containing clear effects, Journal of statistical planning and inference, 136, 4450-4458, (2006) · [Zbl 1099.62084](#)
- [17] Zhang, R.C.; Shao, Q., Minimum aberration $(S^2) S^{n-k}$ designs, Statistica sinica, 11, 213-223, (2001) · [Zbl 0967.62056](#)
- [18] Zhao, S.L.; Zhang, R.C., Bound on the maximum number of clear two-factor interactions for $2^{n-(n-k)}$ designs, Acta Mathematica scientia, 28, 949-954, (2008) · [Zbl 1198.62074](#)
- [19] Zhao, S.L.; Zhang, R.C., $2^m 4^n$ designs with resolution III or IV containing clear two-factor interaction components, Statistical papers, 49, 441-454, (2008) · [Zbl 1148.62063](#)
- [20] Zhao, S.L.; Zhang, R.C.; Liu, M.Q., Some results on $4^m 2^n$ designs with clear two-factor interaction components, Science in China (series A), 51, 1297-1314, (2008) · [Zbl 1143.62043](#)
- [21] Zi, X.M.; Zhang, R.C.; Liu, M.Q., Bounds on the maximum numbers of clear two-factor interactions for $2^{\{(n_1 + n_2) - (k_1 + k_2)\}}$ fractional factorial split-plot designs, Science in China (series A), 49, 1816-1829, (2006) · [Zbl 1106.62089](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.