

# Virtually Balanced Incomplete Block Designs for $v = 22$ , $k = 8$ , and $\lambda = 4$

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## Abstract

When basic necessary conditions for the existence of a balanced incomplete block design are satisfied, the design may still not exist or it may not be known whether it exists. In either case, other designs may be considered for the same parameters. In this paper we introduce a class of alternative designs, which we will call virtually balanced incomplete block designs. From a statistical point of view these designs provide efficient alternatives to balanced incomplete block designs, and from a combinatorial point of view they offer challenging new questions.

*Key Words and Phrases:* BIB designs, pairwise balance, treatment deficiency.

*AMS Subject Classification:* 05B05, 62K05, 62K10.