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Estimating an Experimental Error Variance for Fractional Factorial Designs

In analyzing fractional factorial designs it can be uncertain which higher order interactions are inactive and thus can be pooled to estimate the experimental error variance. It is even less clear how pooling mean squares that are contaminated by an active effect may affect bias or the Type I error. We present simulation results on the performance of four methods for constructing the estimated experimental error variance when one of the mean squares may be active. Replacing the largest contribution to the error MS with the expectation of the maximum order statistic from a chi-square distribution demonstrates good bias reduction.