

## Summary

When homogeneous variances assumption is violated in a two-way ANalysis Of VAriance (ANOVA), classical F-tests often lead to biased results. To overcome this problem, several proposals have been discussed in the literature; Remarkably, two of which relating to approximate degree of freedom (ADF) tests present generally robust and powerful results across all suggested model configurations. This article aims to determine the powerfulness of these two ADF tests based on a contrast analysis over Type I error control and power performance. The author first examined theoretical and empirical aspects between models to demonstrate any differences in the underlying features. Simulation is then performed to determine the quality of the two models. A wide range of model configurations are suggested to facilitate the contrast analysis. Results showed that both models provide remarkably good approximation over all suggested model configurations, and one of them slightly outperformed the other over the interaction effect.

In terms of author's own contribution to this paper, graphics, tables of comparison and simulation R codes are solely developed by author in hope of clearer illustration and readers' further examination. In addition, the author proposed new simulation algorithm to control the approximated power to certain nominal levels.

Keywords: Analysis of variance, Contrast analysis, Factorial designs, Variance heterogeneity