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## NEW CRITERIA FOR TESTS OF DIMENSIONALITY UNDER ELLIPTICAL POPULATIONS

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**Abstract:** We consider tests of dimensionality in the multivariate analysis of variance (MANOVA). Three types of test criteria (Likelihood-Ratio-type, Lawley-Hotelling-type and Bartlett-Nanda-Pillai-type) are popular. As is well known, their null distributions depend on nuisance parameters. When a sample size is large, these criteria are distributed approximately according to chi-squared distributions. However, when the sample size is small, the effect of the nuisance parameters cannot be ignored. Under normal populations, other criteria that do not depend on nuisance parameters were proposed. These criteria are also upper limits for the null distributions of LR-type and LH-type. Under elliptical populations, modified test criteria with a better chi-squared approximation were proposed in the case of a large sample. In this paper, we generalize Schott's results under elliptical populations and obtain new test criteria that do not depend on nuisance parameters.

**Key words:** Elliptical distribution, dimensionality, multivariate analysis of variance, nuisance parameter.

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