

# Near-exact distributions for testing the equality and sphericity of several covariance matrices: the multisample sphericity test

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## Abstract

The multisample sphericity hypothesis can be decomposed in two nested hypotheses, the first one corresponding to the equality of several covariance matrices and the second to the sphericity test. This procedure allows us to work with the decompositions of the characteristic functions for the logarithm of those two test statistics in order to build a near-exact characteristic function that corresponds to a manageable and well known distribution. Using this technique we are able to obtain near-exact distributions for the likelihood ratio test statistic of the multisample sphericity test.

Two measures that are upper bounds on the absolute value of the difference between the exact and the approximate distribution and density functions are used to evaluate the quality of these near-exact approximations and also to compare them with asymptotic approximations for this statistic.

## Keywords

Multisample sphericity, Near-exact distributions, Asymptotic approximations, Covariance matrices, Structure.

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