

# Tools for numerical inversion of the characteristic functions and their applications

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## Abstract

The exact statistical inference frequently leads to a non-standard probability distributions of the considered test statistics, see e.g. [1, 2, 3, 4]. Here we consider simple methods and algorithms for combining characteristic functions of selected probability distributions and their numerical inversion to evaluate the associated CDF and/or PDF. The suggested methods have been implemented as *The Characteristic Functions Toolbox* in MATLAB and R programming environment for statistical computing, [5]. The applicability of the methods and algorithms will be illustrated by computing the exact (small sample) distribution of some well-known test statistics (e.g. the exact null-distribution of the Bartlett test statistic for testing homogeneity of variances), and/or the distribution of selected test statistics in multivariate statistical analysis (as e.g. the distribution of the Wilks Lambda statistic).

## Keywords

Characteristic function, numerical inversion, exact statistical inference, MATLAB/R.

## References

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