ASYMPTOTIC EXPANSIONS FOR THE DISTRIBUTION OF QUADRATIC FORMS IN NORMAL VARIABLES

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Abstract. Higher order asymptotic expansions for the distribution of quadratic forms in normal variables are obtained. The Cornish-Fisher inverse expansions for the percentiles of the distribution are also given. The resulting formula for a definite quadratic form guarantees accuracy almost up to fourth decimal place if the distribution is not very skew. The normalizing transformation investigated by Jensen and Solomon (1972, *J. Amer. Statist. Assoc.*, **67**, 898-902) is reconsidered based on the rate of convergence to the normal distribution.