

# The decomposition of skew chi-square distribution

Weizhong Tian, Tonghui Wang

Department of mathematical sciences, New Mexico State University, USA

## Abstract

The definition of skew chi-square and generalized skew chi-square distribution were proposed by Wang et al. (2009). In this paper, we discussed the sufficient and necessary conditions for the skew chi-square distribution with  $n$  degrees of freedom can be decomposed into one skew chi-square distribution with 1 degrees of freedom and one chi-square distribution with  $n-1$  degrees of freedom. The quadratic form under skew-normal distribution can also be decomposed into one skew chi-square distribution and one chi-square distribution. In the end, the non-central cochren's theorem for skew chi square distributions are discussed.

**Keywords:** Skew  $\chi^2$  distribution, skew-normal, cochran's theorem, quadratic formula, moment generating function.