

## Extending circular distributions through transformation of argument

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**Abstract** This paper considers the general application to symmetric circular densities of two forms of change of argument: one produces extended families of distributions which contain symmetric densities which are more flat-topped, as well as others which are more sharply peaked, than the originals, and the second produces families which are skew. General results for the modality and shape characteristics of the densities which ensue are presented, and maximum likelihood estimation of the parameters of two extensions of the Jones–Pewsey family is discussed. The application of these two particular extended families is illustrated within analyses of data on monthly cases of sudden infant death syndrome in the UK.

**Keywords** Asymmetry · Batschelet distributions · Flat-toppedness · Jones–Pewsey distribution · Papakonstantinou distributions · Peakedness · Skewness · Symmetry