

## **Cross-dependence measures for two-dimensional periodic AR(1) model with alpha-stable noise**

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Abstract:

Discrete-time models with periodic behavior are useful for the description of different phenomenon. The most popular time series taking into consideration the periodicity of the real data is the periodic autoregressive moving average model (PARMA). The PARMA models were considered in the literature from a theoretical and practical point of view. Most of the considerations related to the PARMA models are based on the assumption of the Gaussian (or finite-variance) distribution of the noise. However, in many applications, the Gaussian distribution seems to be inappropriate. Thus, generalized models are considered. The natural extension of the Gaussian distribution is the alpha-stable one which is a perfect distribution for the modeling of real data with large observations. However, for the alpha-stable-based models the classical methods adequate to Gaussian-based systems cannot be used. The main problem comes from the fact that, in general, for the alpha-stable based models the covariance cannot be applied as a measure of dependence. Thus, alternative measures are used. Here, we consider the generalization of the classical PAR model and take into consideration the alpha-stable PAR system. Moreover, we analyze the bidimensional version of the univariate model and examine its structure of cross-dependence in the language of the alternative cross-dependence measures appropriate for the infinite-variance systems. We prove that the ratio of two considered alternative cross-dependence measures tends to the stability index of the noise distribution. This result is the continuation of the authors' previous research where a similar study was performed for one-dimensional models based on the alpha-stable distribution.