

# Marčenko-Pastur law for linear time series with symmetric coefficients

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## Abstract

We study the empirical spectral distribution of the sample covariance matrix of high-dimensional linear time series that extend the classical Marčenko-Pastur law. Specifically, we consider large dimensional linear processes of the form  $X_t = Z_t + \sum_{j=1}^{\infty} A_j Z_{t-j}$ , where  $\{Z_t : t \in \mathbb{Z}\}$  is a sequence of  $p$ -dimensional real or complex-valued random vectors with independent, zero mean, unit variance entries, and the  $p \times p$  coefficient matrices  $\{A_j\}_{j=1}^{\infty}$  are symmetric and simultaneously diagonalizable. We analyze the limiting behavior of the empirical distribution of the eigenvalues of  $\frac{1}{n} \sum_{t=1}^n X_t X_t^*$  when  $p/n \rightarrow c \in (0, \infty)$ .