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# TESTING GAUSSIAN SEQUENCES AND ASYMPTOTIC INVERSION OF TOEPLITZ OPERATORS

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*Abstract:* This paper is motivated by the statistical problem of testing a zero-mean stationary Gaussian probability measure $P$ on $R^Z$ against a similiar probability $Q$. The method uses a sequence of Neyman-Pearson's tests of the finite sections $P_n$ of $P$ against the corresponding sections $Q_n$ of $Q$. First, following D. Dacunha-Castelle, we discuss the behaviour of the power achieved for levels approaching zero exponentially fast at a suitable rate. Then, considering the likelihood ratio of $Q_n$ w.r.t. $P_n$, we ask whether there exist approximate inverses of the covariance matrices of these probabilities, and approximates of their determinants, which preserve the asymptotics of the tests considered. It turns out that these matrices are finite sections of the Toeplitz operators whose symbols are the spectral densities of $P$ and $Q$. Using results of H. Widom on this class of operators we point out that such approximations exist and work under some factorisation condition for spectral densities. It is also shown that the same approximation method works for asymptotic solving of a class of discrete Wiener-Hopf equations.

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