

INÉGALITÉS DE TRACE POUR DES MATRICES DE TŒPLITZ ET
APPLICATIONS À DES VRAISEMBLANCES GAUSSIENNES

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Abstract: Let u be an integrable function on the 1-dimensional torus and $T_n(u)$ be the Toeplitz matrix with entries $\hat{u}(s-t)$, $0 \leq s, t \leq n-1$, where \hat{u} is the Fourier transform of u . In this paper, it is shown that if u_1, \dots, u_r are in the Banach algebra of those u that satisfy $\|u\| = \|u\|_\infty + \|u\|_{1/2} < \infty$, where $\|u\|_\infty$ is the L^∞ -norm of u and $\|u\|_{1/2} = (\sum_{-\infty}^{+\infty} |t| |\hat{u}(t)|^2)^{1/2}$, then

$$\|T_n(u_1 \dots u_r) - T_n(u_1) \dots T_n(u_r)\|_1 \leq \sum_{i < j} \|u_i\|_{1/2} \|u_j\|_{1/2} \prod_{k \neq i, j} \|u_k\|_\infty,$$

where the norm on the left is the trace class norm. Using the inequality $|\operatorname{tr}(A)| \leq \|A\|_1$ (tr for trace), it is shown that if boundedness is replaced by continuity, then $\operatorname{tr}(T_n(u_1 \dots u_r) - T_n(u_1) \dots T_n(u_r))$ is convergent ($n \rightarrow \infty$). These results are used to study Whittle's approximation error for log-likelihoods of stationary Gaussian sequences. It is shown that its moments are bounded or convergent under suitable conditions for spectral densities.

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