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ON SPECTRAL DENSITY ESTIMATES FOR A GAUSSIAN PERIODICALLY CORRELATED RANDOM FIELD

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Abstract: We consider a random field $\xi(t)$, $t = (t_1, t_2) \in R^2$, having mean value zero and the correlation function $B(t,\tau) = B(t_1, t_2, \tau_1, \tau_2) = E\xi(t_1 + \tau_1, t_2 + \tau_2)\xi(t_1, t_2)$, which is periodic in the sense that $B(t_1 + T_1, t_2 + T_2, \tau) \equiv B(t_1 + T_1, t_2, \tau) \equiv B(t_1, t_2, \tau)$ (here the periods T_1 and T_2 are positive). It is shown that under broad conditions the spectral decomposition of the correlation function $B(t,\tau)$ is represented by the countable set of spectral densities $f_{j_1 j_2}(\lambda_1, \lambda_2)$ where $(j_1, j_2) \in Z^2$ and $(\lambda_1, \lambda_2) \in R^2$. For the case where the random field under consideration is Gaussian, nonparametric estimates of the spectral densities $f_{j_1 j_2}(\lambda_1, \lambda_2)$ are introduced and studied.

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