

**Integrals with circularly hooked arguments and their applications to the problems in statistics of random processes**

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**ABSTRACT**

Let  $(T, \mu)$  be a measured space endowed with a  $\sigma$ -finite measure  $\mu$ . We consider integrals having the following form:

$$\begin{aligned} \overleftarrow{I}_n(K_1, \dots, K_n; \varphi) &= \int \cdots \int_{T^n} K_1(t_1, t_2) K_2(t_2, t_3) \cdots K_{n-1}(t_{n-1}, t_n) \times \\ &\quad \times K_n(t_n, t_1) \varphi(t_1, \dots, t_n) d\mu(t_1) \dots d\mu(t_n). \end{aligned}$$

These integrals appear in different expressions representing the moment functions and the cumulants of sample correlograms and sample spectral functions of stationary stochastic processes and homogeneous random fields. This is why we study the above integrals and their applications to the problems of correlation analysis and spectral analysis in nonparametric setting [1–4].

We establish Hölder–Young inequalities for the integrals  $\overleftarrow{I}_n(K_1, \dots, K_n; \varphi)$  enabling us to investigate the asymptotic behaviour of the integrals  $\overleftarrow{I}_n(K_1^\sigma, \dots, K_n^\sigma; \varphi)$  whose kernels depend on a parameter  $\sigma$ . We apply our results to different problems related to the cross-correlogram type estimates, in particular, to the problem of estimation of the response function in Volterra systems.

**References**

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