ON THE ESTIMATE FOR THE COVARIANCE FUNCTION OF HOMOGENEOUS AND ISOTROPIC VECTOR-VALUED RANDOM FIELD ON THE SPHERE

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Let $\vec{\xi}(P,t), t \in S_n$ a homogeneous on time variable and isotropic on a space variable vector-valued random field with components $\xi_a(P,t), a = 1,...,r$ on $S_n \times Z_+$ where $S_n -$ is the unit sphere of the n-rd dimensional space R^n and $R = (-\infty;+\infty)$, which has finite second order moment and which for each t is continuous in quadratic mean (q.m.) . $E\vec{\xi}\ (P,t) = \mu, \mu -$ unknown.

Let field $\vec{\xi}(P,t)$ is observed for all points of S_n and on time $[0,T]$. As an estimate of the covariance function of a random field the following statistics is considered:

$$B^T(\theta,t) = \omega_n^{-1} \sum_{m=0}^{N_T} h(m,n) \frac{C_m^{\frac{n-2}{2}}(\cos\theta)}{C_m^{\frac{n-2}{2}}(1)} \hat{r}_m^T(t)$$

where ${}_{a,b}r_m^T(t) = \int_0^T e^{i\lambda t}{}_{a,b}\ I_m^T(\lambda)d\lambda$, $h(m,n) = (2m+n-2)\dfrac{(m+n-3)!}{(n-2)!m!}$ is the number linearly independent spherical harmonics of degree m, where $\omega_n = 2\pi^{n/2} / \Gamma(n/2)$ -of the area of the surface S_n and $C_m^{\upsilon}(x), (\upsilon \neq 0)$ - Gegenbauer polynomials, for each T, N_T is a positive integer and $N_T \to \infty$ as $T \to \infty, \theta \in [0,\pi]$.

In this paper we study asymptotic distribution estimate of the covariance function $B^T(\theta,t)$ of a random fields $\vec{\xi}(P,t)$.