SPECTRAL DECOMPOSITIONS OF RANDOM SEQUENCES OF AN INFINITE RANK OF UNSTATIONARY WITH SPECTRUM AT ZERO

CheremskayaN.V.
National Technical University
«KharkivPolytechnicInstitute»,
Kharkiv

This note is devoted to the study of the spectral decomposition of random sequences of infinite rank of nonstationarity with a continuous spectrum.

Difference equations associated with operator nodes are used to construct spectral decomposition of random sequences of infinite rank of nonstationarity, which are considered as sequences in the corresponding Hilbert space $H = L^2_{[0,l]}$.

Theorem. For each complete dissipative sequence $x_n = A^n x_0$ finite quasi-rank, where$A$completely unconjugated operator with spectrum at zero, there is a spectral measure $z_x\ (0 \le x \le l)$ and set functions $\theta_\alpha(x)\left(\alpha = \overline{1,r}\right)$, which satisfy the following conditions:

1) $\langle \Delta_1 z, \Delta_2 z \rangle = \rho(\Delta_1 \cap \Delta_2)$, де $\Delta_k z(k = 1,2)$ – increment z_k respectively on intervals Δ_k, $\rho(\Delta_1 \cap \Delta_2)$ – the length of the common part of the intervals Δ_k;

2) $\sum\limits_{\alpha=1}^{r} \left|\theta_\alpha(x)\right|^2 \equiv 1 \qquad (0 \le x \le l)$;

3) $\int\limits_0^l \theta_a(x)\overline{\theta_\beta(x)}dx = \omega_\alpha \delta_{\alpha\beta}$

and such that sequence x_n can be depicted as: $x_n = \int\limits_0^l f(n,x)dz_x$, where function $f(n,x)$ is from the system of equations:

$$f(n+1,x) = -i\sum_{\alpha=1}^{r} \theta_\alpha(x) u_\alpha(n,x),$$

$$\frac{du_\alpha(n,x)}{dx} = -if(n+1,x)\theta_\alpha(x),$$

$$f(n,x)\big|_{n=0} = f_0(x), \qquad f_0(x) \in L^2_{[0,l]}$$

$$u_\alpha(n,x)\big|_{x=0} = u_\alpha(n) \qquad \left(\alpha = \overline{1,r}\right),\ u_\alpha(n) \equiv 0.$$

This theorem can be used to construct spectral expansions of inhomogeneous random fields in solving multidimensional practical problems.