

ABOUT ONE CLASS OF LINEAR TRANSFORMATIONS OF NON-STATIONARY RANDOM SEQUENCES

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The paper deals with the problem of linear transformations of non-stationary random sequences of certain classes.

Consider a random sequence $\xi(n, \omega)$ second order with $M\xi(n, \omega) = 0$. Let $K(n, m) = M\xi(n, \omega)\overline{\xi(m, \omega)}$ is correlation function. After embedding $\xi(n, \omega)$ in Hilbert space H_ξ get the sequence x_n at H_ξ , where $K(n, m) = \langle x_n, x_m \rangle_{H_\xi}$. Sufficiently wide classes of random sequences within the framework of the correlation theory can be obtained by considering linear transformations of sequences. x_n at H_ξ . The sequence $z_n = Bx_n$ is called the dilation of the r -th order of the sequence x_n , if B is linear bounded operator in H_ξ and $\dim(I - B^*B)H_\xi = r$. The function $W(n, m) = K(n+1, m) - K(n, m+1)$ of two discrete arguments will be called the correlation difference.

Theorem. In order to z_n be a first-order dilatation of a stationary sequence x_n , it is necessary and sufficient that it is correlation difference be:

$$W_{zz}(n, m) = W_{xx}(n - m) + \sum_{\alpha, \beta=1}^2 \Phi_\alpha(n) J_{\alpha\beta} \overline{\Phi_\beta(m)},$$

where $W_{xx}(n - m) = 2i \int_{-\pi}^{\pi} \sin \lambda e^{i(n-m)\lambda} dF(\lambda)$, $F(\lambda)$ – non-decreasing function of limited variation, $J_{\alpha\beta} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$, where $\Phi_\alpha(n)$ – linear functional from x_n and $\Phi_1(n+1) = \Phi_2(n)$.

Theorem. In order z_n to be a first-order dilation of a sequence $x_n = A^n x_0$, where A is a bounded dissipative operator with a discrete spectrum $\{\lambda_k\}$ and a one-dimensional non-Hermitian subspace, it is necessary and sufficient that it is correlation difference be: $W_{zz}(n, m) = i\varphi(n)\overline{\varphi(m)} + \sum_{\alpha, \beta=1}^2 \Phi_\alpha(n) J_{\alpha\beta} \overline{\Phi_\beta(m)}$,

where $\varphi(n) = \sum_{k=1}^{\infty} C_k \Lambda_k(n)$; $\sum_{k=1}^{\infty} |C_k|^2 < \infty$; $\Lambda_k(n) = -\frac{1}{2\pi i} \oint_{\gamma} \lambda^n \frac{\beta_k}{\lambda_k - \lambda} \prod_{j=1}^{k-1} \frac{\lambda_j - \lambda}{\lambda_j - \lambda} d\lambda$;
 $(J_{\alpha\beta}) = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$, and $\Phi_\alpha(n)$ – linear functional from z_n .