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ESTIMATES OF DISTRIBUTIONS OF FUNCTIONALS FROM THE MODULE OF STATIONARY GAUSSIAN PROPER COMPLEX RANDOM PROCESSES

This work deals with complex random processes which are one of the most important generalizations of the concept of random process. We presented results of estimates of distributions of functionals from the module of stationary Gaussian proper complex random processes are obtained (for more results see, for example, [1], [2]).

Theorem 1

Let $X(t)=\{X(t),t\in[a,b]\}$ be a Gaussian stationary proper complex random process and let $|X(t)|=\left(X_c^2(t)+X_s^2(t)\right)^{1/2}$. Then for $u\geq\left(\frac{p}{\sqrt{2}}+\sqrt{\left(\frac{p}{2}+1\right)p}\right)\sigma^2\left(b-a\right)^{1/b}$ the following inequality holds:

$$P\left\{\left\|X^2(t)-\sigma^2\right\|_{L_p([a,b])}>u\right\}\leq 2\sqrt{1+\frac{u\sqrt{2}}{(b-a)^{1/p}\sigma^2}}\cdot\exp\left\{-\frac{u}{\sqrt{2}(b-a)^{1/p}\sigma^2}\right\}. \qquad (1)$$

Theorem 2

Let $X(t)=\{X(t),t\in[a,b]\}$ be a Gaussian stationary proper complex random process and let $|X(t)|=\left(X_c^2(t)+X_s^2(t)\right)^{1/2}$. If $X(t)$ is a separable process, then for all integer $M>1$ and all $u>\frac{2\sqrt{2}\sigma^2M}{\alpha}\left(\max\left(1,\left(\frac{b-a}{2}\right)^{\alpha/2}2\sqrt{c}\right)^{\frac{1}{M-1}}\right)$ we have:

$$P\left\{\sup\left|\left(X(t)\right)^2-\sigma^2\right|>x\right\}\leq 4e^{\frac{2(M+1)}{\alpha}}\cdot\exp\left\{-\frac{x}{\sqrt{2}\sigma^2}\right\}\left(\frac{\alpha x}{2\sqrt{2}\sigma^2M}\right)^{\frac{2M}{\alpha}}\left(1+\frac{\sqrt{2}x}{\sigma^2}\right)^{1/2}. \qquad (2)$$

Conclusion. The complex random processes are especially relevant when the narrowbanded processes are investigated. These processes are exploited as models of complex amplitudes of quasiharmonic oscillations or waves in radiophysics and optics.

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