M. Yu. Ryazantsev (Voronezh State University, Voronezh, Russia). **The existence of a solution to a stochastic differential equation.**[1)]

Here we investigate the stochastic algebraic-differential equation, whose matrix pencil is regular and satisfies the rank-degree condition, using special second order mean derivative. This allows us to take into account quantum effects in the device that turn the deterministic incoming signal into a stochastic process. We prove the existence of solution of this equation.

Consider the second order stochastic algebraic-differential equation

$$\begin{cases} \frac{1}{2}A(DD_* + D_*D)\eta(t) = B\eta(t) + f(t) \\ D_2\eta(t) = A \end{cases}, \tag{1}$$

we interpret (1) as equation describing dynamically distorted signasls in an electronic device, where the matrices A and B describe the device, the deterministic function $f(t)$ is the ingoing signal, the stochastc process $\eta(t)$ is the outgoing signal.

Let us introduce a function $t_0(t)$, equal to $\frac{1}{t_0}$, if $0 \leq t \leq t_0$ and $\frac{1}{t}$, if $t_0 \leq t$, where t_0 small enough value.

Theorem 1. *There exists a process $\eta(t)$, starting at $t = 0$, that for $t \in [t_0, T]$ satisfies equation (1).*

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