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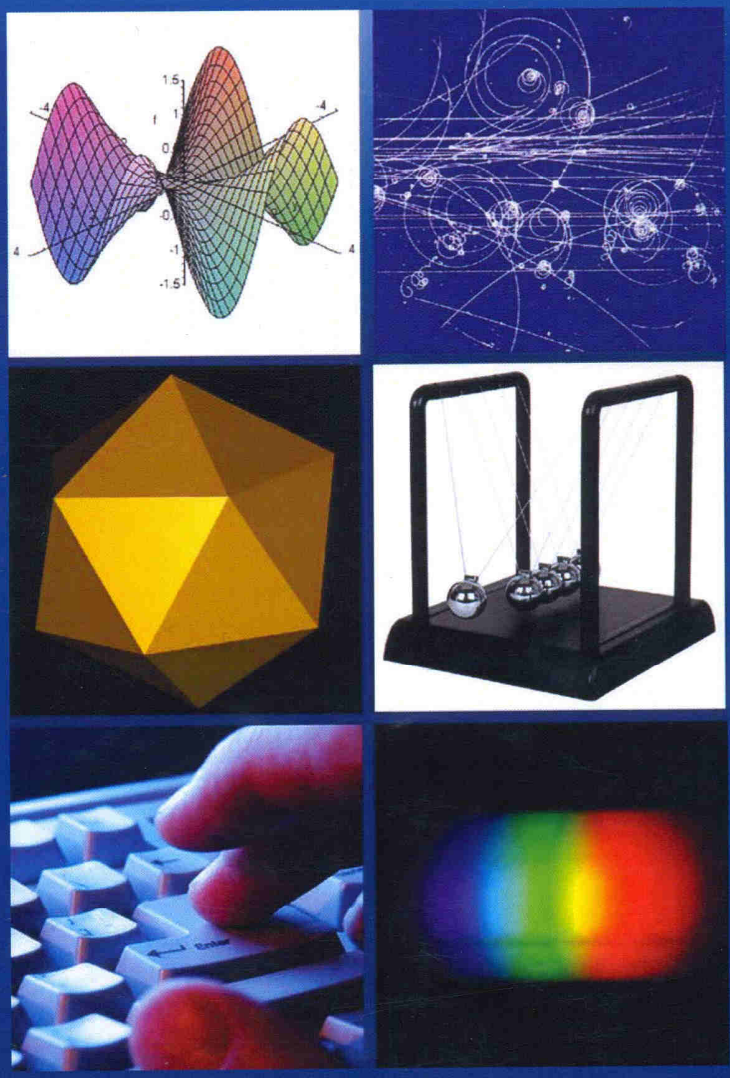

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## Contents

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[1] S. Dalabaev, [2] S.T. Mukhambetzhanov, [2] B.A.Urmashev, [2] Z.M. Abdiakhmetova*

[1]Department of Electronic & Information Science, Xinjiang University, Urumchi, China,
[2]Faculty of Mechanic-Mathematical, al-Farabi Kazakh National University, Almaty, Kazakhstan
*e-mail: azmbbe@mail.ru

# Noise-immunity of system using pseudo-noise signal

**Abstract.** We consider the optimum algorithms processing pseudo-noise signals (PNS). We discuss variants of circuits for adaptive nonlinear changer that ensure increasing the anti-jamming of radio technical systems (RTS). Signal noise suppression (PNS) system function has the following characteristics such as limited by time or optimal the performance of processing the frequency through, in order to fully ensure greater PNS system's performance of anti-jamming. Redundancy in the transmitted signal is important for expansion of occupying frequency band. The gain of signal transmitter to reach the receiver in radio system (RTS) in the PNS system under the effect of interference. In general, it is non-Gaussian random process.

***Keywords:*** System Using Pseudo-noise Signal (PNS), Auto Phase Control (APC), Adaptive Nonlinear Changer, Adaptive Amplitude-frequency Noise Suppressor, changer.

## Introduction

Random effects in white Gaussian noise channel depicted by the optimal receiver, the SNR are listed as follow Equation

$$qo = qle. \qquad (1)$$

$e$ is the efficiency of the reference signal, which refer to the ratio of the bandwidth between the transmit signal and transmit information [1].

The function of receiver required by the normalized received signal's level. Other strong interference mixed with input, so, we had to use protection in receiver in strong interference [2].

## Optimal receiving in noise suppression signal system

A widely known method of radio interference suppression is offset (reject) the power of interference received by the receiver. It was shown by the Figure 1.

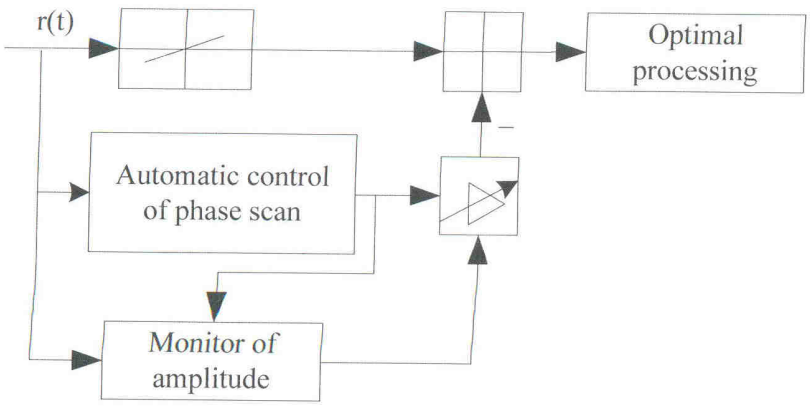


**Figure 1** – Radio interference suppression

 

The function of output of subtractor is offset the impact of interference power, capturing and tracking the phase of automatic phase control (APC) scanner. Measured amplitude achieve the function of balance AM to scan output signal form the APC by the role of fluctuation law.

A series of strict thing still missed in this processor in order to fully offset the interference completely, which is the necessary timing in APC scanning to capturing and scanning the interference; don't receive in the rapid changes environment; technical devices used to offset the interference; that has strong narrowband interference stimulate in useful band of noise suppression signal. Complex processing equipment is important if we wait to describe the equilibrium fluctuations channel [3].

Use of limiting freedom of information cannot export the statistical properties of interference. In this case, when the access non-linear converter signal processing channel, the amplitude characteristics is,

$$z(r) = -\frac{d\ln[p(r)]}{dr}. \qquad (2)$$

The p(r) was the interference of the probability density.

Use that devices in radio, when the converter's performance is good, the amplitude characteristics is,

$$z(r) = r - \pi a * sign(r)/4. \qquad (3)$$

The a* is the estimate of the interference range [4].

The structure of radio signals from suppression interference margin follows figure 2. In figure 2 Band-pass is matched frequency of occupying by useful signal.

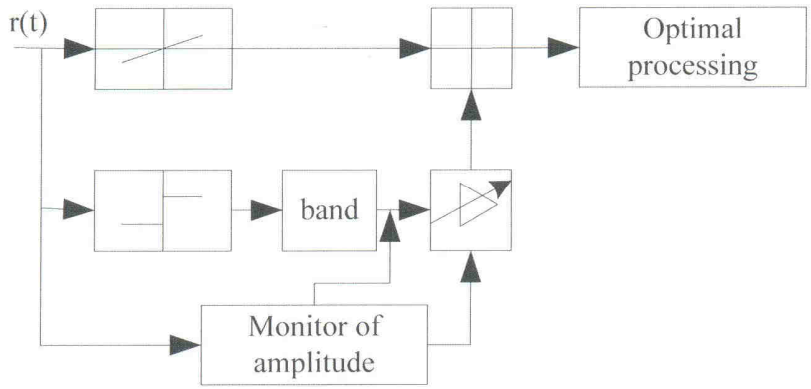


**Figure 2** – The structure of radio signals from suppression interference margin

By the principle of suppressing strong interference of band, exporting Figure 3 (Does not consider the interference of Intersecting adjustment in nonlinear converter).

From the Figure, In-band interference, the nonlinear processing can achieve the same efficiency of suppression of strong interference bands. The output ratio of the PNS is,

$$qo = qIeu. \qquad (4)$$

The u is amplitude factor of interference suppression. It is related with the overall distribution of interference in the non-linear processor [5].

$$u = \frac{P < dz(r)/dr > 2w}{< z2(r) >} w. \qquad (5)$$

The P is the noise power inputting the nonlinear converter; the <> w is the statistical averaging operator of interfere process, including non-linear processing to reach the desired signal band interference components. Non-bypass that, given the non-linear converter crosstalk, factors including the destruction of receiver [6, 7].

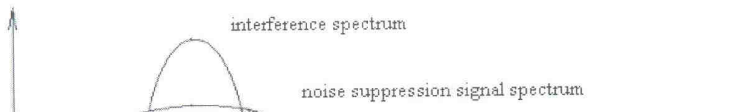


**Figure 3** – Amplitude characteristics

From the Figure 3 which gave amplitude characteristics, we obtain Figure 4 which gave experimental study of nonlinear converter [8]. Figure 4 gives frequency with strong harmonic interference suppression factor curve. From the Figure 4, frequency and phase in the strong interference effect, the scanning and tracking cannot be achieved, then the nonlinear converter in a wide enough band (about 16% of center frequency) noise suppression to ensure efficiency [9].

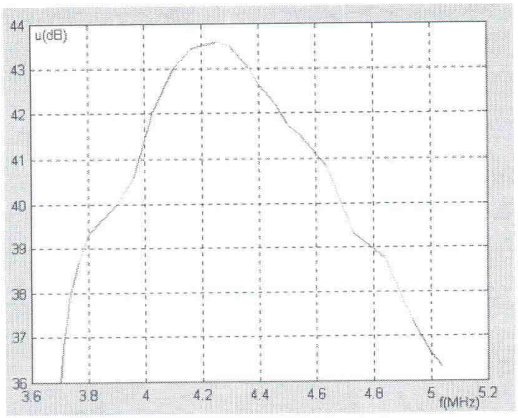


**Figure 4** —Experimental study of nonlinear converter

This fully shows that, taking into account the statistical properties of interference in the case of a complex variable interference, the anti-jamming and function of PNS system was improved [10].

## Conclusions

In nonlinear filtering method observation with passive parameter complex signal, use range suppression strong interference. In different nonlinear converter, estimated from the noise suppression to study possible ways to receive a good performance. Adaptive and non adaptive interference structure derived suppressor magnitude different. Good analytical performance nonlinear adaptive signal converter receives useful role in accurate process.

The helpful role of the process of signal can

be received accurately by a good performance of nonlinear adaptive analysis of the converter

In the complex FM receiving signal lines that inhibit the interference of the AM experimental results showed that by suppressor efficiency up to 20 to 40 dB.

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