

# Passive Hindrances Suppression Using Complex Polyphase Signals

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**Abstract** - Using complex signals we get possibility of indemnification of passive hindrances in the single-channel system of radio monitoring due to the use of correlation and spectral characteristics of certain class of complex signals.

**Keywords** – Frank's code, GFC, specter.

## I. INTRODUCTION

One type of such signals, using which signals we get possibility of indemnification of passive hindrances are polyphase signals formed on the base of the generalized Frank's codes (GFC) with fractional parameters  $p$ . The algorithm of forming of such signals is offered by authors, and the results of researches of such signals are published in [1].

*Forming generalized Frank's codes (GFC).* By GFC we define a discrete difficult (complex) signal which consists of the sequence of elementary signals, amplitude and phase of which we get according to the algorithm:

$$\Theta_n = \Theta_{pN+m} = pm \frac{2\pi}{N}, \quad 0 \leq N-1, 0 \leq m \leq K-1;$$

$$A_n = \begin{cases} 1, & 0 \leq m \leq L-1 \\ 0, & L \leq m \leq K-1 \end{cases} \quad (1)$$

Where  $N$  is a number of levels of phases in signal.

GFC is formed as follows. A time domain equal to the duration of the signal  $T_s$  is divided in  $M=NK$  temporal positions of duration  $T_0 = T_s/M$ . On each of these temporal positions radio signals with frequency  $f_0$  are formed, rounding and initial phase if which are chosen according to the algorithm (1).

## II. PROPERTIES OF AMBIGUITY FUNCTION

Properties of ambiguity function of GFC substantially rely on correlation between parameters  $N$ ,  $L$  and  $K$ . In the case  $N=L=K$ , GFC is an ordinary Frank's code. Whne  $L=K$  amplitudes of all elementary signals are equal to 1: in the case  $L < K$  amplitudes of elementary signals can take value between 0 or 1. The conducted researches showed that GFC with multiple correlations between  $L$  and  $N$  have the best correlation properties. Therefore we focused on the research of GFC with  $L=pN$ ,  $p=0.3; 0.4; 0.5; 0.6$  and  $0.7$ .

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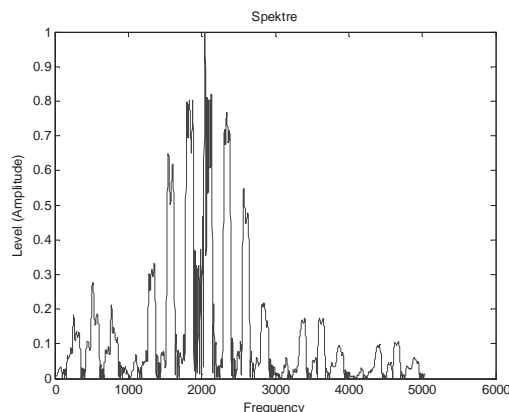


Fig.1 Specter of GFC with  $p=0.4$

Conducted investigations of particular GFC has shown that its specter has periodical minimums with constant width. Also their width depends on the parameter  $p$ , and it becomes narrower as parameter  $p$  comes closer to 1.

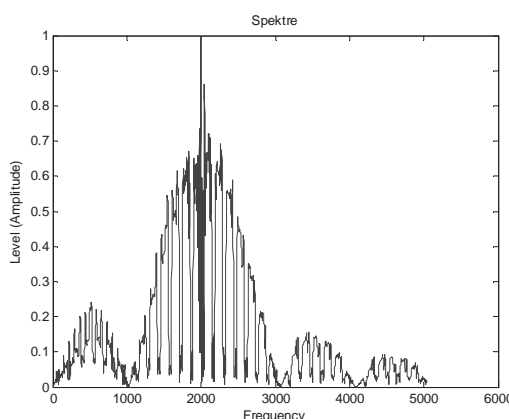


Fig.2 Specter of GFC with  $p=0.7$

## III. CONCLUSION

In this paper the passive hindrances suppression using complex polyphase signals, the results of GFC with different value of parameter  $p$  were described.

## REFERENCES

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