

The proposed method for noncoherent decoding of multiposition signals can be used for transmitting messages in distant measurement systems, remote control systems, communication systems, and in computing technique. Input signals $y(t)$

$= u(X_j, t) + n(t)$, $0 \leq t \leq T_c$, where $u(X_j, t)$, $j = \overline{1, m}$, - undistorted signal with duration of T_c , $n(t)$ - additive noise, $X_i = (x_{1i}, x_{2i}, \dots, x_{ki})$ - residue-free binary code series that is transmitted by using the $u(X_i, t)$ signal, $m = 2^k$ possible signals $u(X_i, t)$, $i = \overline{1, m}$, where $X_i = (x_{1i}, x_{2i}, \dots, x_{ki})$, and mathematical probabilities $P(X_i)$ of these signals are converted into m empirical probabilities of receiving possible signals.

When decoding, the probabilities $P(X_i/y)$ are combined into $2k$ subgroups, the pairs of which form k groups so that the first and second sums of the probabilities $P(X_i/y)$ of the subgroups of the h -th group, where $h = \overline{1, k}$, are accordingly equal to the empirical probabilities

$$P\left(\frac{x_h=1}{y}\right) = k_0 \cdot \sum_{x_{11}=0}^1 \dots \sum_{x_{h1}=0, x_{h1}=x_h \neq 0}^1 \dots \sum_{x_{k1}=0}^1 \exp\{-[E_1/N_0 - \ln P(X_1)]\} \cdot I_0(2V_1/N_0);$$

$$P\left(\frac{x_h=0}{y}\right) = k_0 \cdot \sum_{x_{11}=0}^1 \dots \sum_{x_{h1}=0, x_{h1}=x_h \neq 1}^1 \dots \sum_{x_{k1}=0}^1 \exp\{-[E_1/N_0 - \ln P(X_1)]\} \cdot I_0(2V_1/N_0)$$

of the 1 and 0 values of the h -th binary characters of the code series $X=(x_1, x_2, \dots, x_k)$. The empirical probabilities combined into groups are added, and the logarithms of the adding result values are taken. Then the differences of the logarithms obtained are formed so that the h -th difference is equal to the likelihood ratio

$$\hat{X}_h = \ln[P(xh=1/y) / P(xh=0/y)]$$

of the values of the h -th binary character of the code series $X=(x_1, x_2, \dots, x_k)$, and is the h -th component of the input signal.

The proposed method provides for a possibility to enhance the signal noise stability and decoding process efficiency in transmitting information messages.