Methods of nulling numbers in the system of residual classes

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Abstract. The article presents the nullification of numbers in the system of residual classes (SRC). This method is widely used in the non-positional number system in the SRC with the need to determine positional characteristics. Two methods of nullification are presented in the article: the method of successive subtractions and the method of parallel subtractions. Based on these methods, algorithms are developed for their implementation. The essence of the method of successive subtractions is that the nullification procedure is carried out consequently from the junior foundation to the oldest. The essence of the parallel subtraction method is that the nullification procedure is carried out parallel in time for two reasons. It is advisable to use these methods in the implementation of operations of comparing numbers in the SRC, and in monitoring data presented in the SRC. The estimation of these methods by the number of equipment and by the time of implementation of the nullification procedure is made. In terms of the efficiency of the nullification procedure, a parallel subtraction method was proposed.

Keywords: methods of nulling numbers; method of successive subtractions; nullification constants; nullification block; nullification procedure; parallel nullification method; sequential nullification; system of residual classes.

1 Methods of data control in the system of residual classes based on the principle of nulling

One of the methods for determining the correctness of a number is the nulling (nullification) method, which consists in the transition from the initial number.

$$A = (a_1, a_2, ..., a_n, a_{n+1}) \tag{1}$$

to the number:

$$A^Z = (0, 0, ..., 0, \gamma_{n+1}) \quad (2)$$

with the help of such a sequence of transformations in which there is no output outside the working range of the system of residual classes (SRC) [1-8].

The process of nulling a number consists in successively subtracting from this number the nulling constants of the form:

$$(m_{1.1}, m_{1.2}, ..., m_{n+1}) \text{, where } m_{1.1} = (1, 2, ..., m_1 - 1) \text{;}$$

$$(0, m_{2.2}, ..., m_{n+1,2}) \text{, where } m_{2.2} = (1, 2, ..., m_2 - 1) \text{.}$$

In this case, the number $A = (a_1, a_2, ..., a_n, a_{n+1})$ is sequentially converted to a form $A' = (0, a'_2, ..., a'_n, a'_{n+1})$, then to a number $A'' = (0, 0, ..., a''_n, a''_{n+1})$ etc.
By repeating the process n times, we get:

$$A^{(Z)} = (0, 0, ..., 0, \gamma_{n+1}) .$$

If $\gamma_{n+1} = 0$, then the original number is correct and lies in the range $[0, M)$, if $\gamma_{n+1} \neq 0$, then the number is incorrect and lies in the range $[jM, (j+1)M)$, for $j = (1, 2, ..., m_{n+1} - 1)$, where $(j+1)$ is the value of the number of the interval in which the operand $\tilde{A}$ falls.

We show that an error ΔA can transfer the correct number A, lying in the interval $[0, M)$, only in one of the two intervals.
We write $\tilde{A} = A + \Delta A$, i.e.

$$\tilde{A} = (a_1, a_2, ..., a_n, a_{n+1}) + (0, 0, ..., \Delta a_i, ..., 1) . \quad (3)$$

Obviously, ΔA is not in the first (working) interval $[0, M)$, since the first interval contains the correct number:

$$A_0 = (0, 0, ..., 0, 0) .$$

Let ΔA be in the k-th interval:

$$(k-1)M \le \Delta A \le kM .$$

We write the system of two inequalities:

$$\begin{cases} 0 \le A < M, \\ (k-1)M \le \Delta A < kM. \end{cases}$$

Add up the two inequalities:

$$(k-1)M \le A + \Delta A \le (k+1)M .$$

Let $j = k - 1$, then we can write:

$$jM \le \tilde{A} < (j+2)M ,$$

i.e. an error may cause the correct operand to be incorrect, lying only in one of two intervals $[jM, (j+1)M)$ or $[(j+1)M, (j+2)M)$.

2 Method of successive subtractions

Consider the nulling procedure in terms of the time of its implementation. The essence of the first (*Z1*), the basic in the theory of SRC, nullification procedure (the procedure of sequential nullification (SN)) consists of a sequence of operations for subtracting in form:

$$A^{(i+1)} = A^{(i)} - NC^{(i)}, \quad (4)$$

by means of a set of NC of the form (5):

$$NC^{(0)} = [t_1^{(0)} \| t_2^{(0)} \| t_3^{(0)} \| \ldots \| t_{i-1}^{(0)} \| t_i^{(0)} \| t_{i+1}^{(0)} \| \ldots \| t_{n-3}^{(0)} \| t_{n-2}^{(0)} \| t_{n-1}^{(0)} \| t_n^{(0)} \| t_{n+1}^{(0)}] ,$$

$$t_1^{(0)} = a_1^{(0)},\ t_1^{(0)} = \overline{0, m_1 - 1};$$

$$NC^{(1)} = [0 \| t_2^{(1)} \| t_3^{(1)} \| \ldots \| t_{i-1}^{(1)} \| t_i^{(1)} \| t_{i+1}^{(1)} \| \ldots \| t_{n-3}^{(1)} \| t_{n-2}^{(1)} \| t_{n-1}^{(1)} \| t_n^{(1)} \| t_{n+1}^{(1)}] ,$$

$$t_2^{(1)} = a_2^{(1)},\ t_2^{(1)} = \overline{0, m_2 - 1};$$

$$NC^{(2)} = [0 \| 0 \| t_3^{(2)} \| \ldots \| t_{i-1}^{(2)} \| t_i^{(2)} \| t_{i+1}^{(2)} \| \ldots \| t_{n-3}^{(2)} \| t_{n-2}^{(2)} \| t_{n-1}^{(2)} \| t_n^{(2)} \| t_{n+1}^{(2)}] ,$$

$$t_3^{(2)} = a_3^{(2)},\ t_3^{(2)} = \overline{0, m_3 - 1};$$

$$NC^{(i-1)} = [0 \| 0 \| 0 \| \ldots \| 0 \| t_i^{(i-1)} \| t_{i+1}^{(i-1)} \| \ldots \| t_{n-3}^{(i-1)} \| t_{n-2}^{(i-1)} \| t_{n-1}^{(i-1)} \| t_n^{(i-1)} \| t_{n+1}^{(i-1)}] ,$$

$$t_i^{(i-1)} = a_i^{(i-1)},\ t_i^{(i-1)} = \overline{0, m_i - 1};$$

$$NC^{(n-2)} = [0 \| 0 \| 0 \| \ldots \| 0 \| 0 \| 0 \| \ldots \| 0 \| 0 \| t_{n-1}^{(n-2)} \| t_n^{(n-2)} \| t_{n+1}^{(n-2)}] ,$$

$$t_{n-1}^{(n-2)} = a_{n-1}^{(n-2)},\ t_{n-1}^{(n-2)} = \overline{0, m_{n-1} - 1};$$

$$NC^{(n-1)} = [0 \| 0 \| 0 \| \ldots \| 0 \| 0 \| 0 \| \ldots \| 0 \| 0 \| 0 \| t_n^{(n-1)} \| t_{n+1}^{(n-1)}] ,$$

$$t_n^{(n-1)} = a_n^{(n-1)},\ t_n^{(n-1)} = \overline{0, m_n - 1}, \quad (5)$$

from the corresponding numbers:

$$A^{(0)} = [a_1^{(0)} \| a_2^{(0)} \| a_3^{(0)} \| \ldots \| a_{i-1}^{(0)} \| a_i^{(0)} \| a_{i+1}^{(0)} \| \ldots \| a_{n-3}^{(0)} \| a_{n-2}^{(0)} \| a_{n-1}^{(0)} \| a_n^{(0)} \| a_{n+1}^{(0)}] ,$$

$$A^{(1)} = [0 \| a_2^{(1)} \| a_3^{(1)} \| \ldots \| a_{i-1}^{(1)} \| a_i^{(1)} \| a_{i+1}^{(1)} \| \ldots \| a_{n-3}^{(1)} \| a_{n-2}^{(1)} \| a_{n-1}^{(1)} \| a_n^{(1)} \| a_{n+1}^{(1)}] ,$$

$$A^{(2)} = [0 \| 0 \| a_3^{(2)} \| \ldots \| a_{i-1}^{(2)} \| a_i^{(2)} \| a_{i+1}^{(2)} \| \ldots \| a_{n-3}^{(2)} \| a_{n-2}^{(2)} \| a_{n-1}^{(2)} \| a_n^{(2)} \| a_{n+1}^{(2)}] ,$$

$$A^{(i-1)} = [0 \| 0 \| 0 \| \ldots \| 0 \| a_i^{(i-1)} \| a_{i+1}^{(i-1)} \| \ldots \| a_{n-3}^{(i-1)} \| a_{n-2}^{(i-1)} \| a_{n-1}^{(i-1)} \| a_n^{(i-1)} \| a_{n+1}^{(i-1)} .$$

For example: performing the first subtraction operation:

$$A^{(1)} = A^{(0)} - NC^{(0)} = [a_1^{(0)} \| a_2^{(0)} \| a_3^{(0)} \| \ldots \| a_{i-1}^{(0)} \| a_i^{(0)} \| a_{i+1}^{(0)} \| \ldots$$

$$\ldots \| a_{n-3}^{(0)} \| a_{n-2}^{(0)} \| a_{n-1}^{(0)} \| a_n^{(0)} \| a_{n+1}^{(0)}] - [t_1^{(0)} \| t_2^{(0)} \| t_3^{(0)} \| \ldots \| t_{i-1}^{(0)} \| t_i^{(0)} \| t_{i+1}^{(0)} \| \ldots$$

$$\ldots \| t_{n-3}^{(0)} \| t_{n-2}^{(0)} \| t_{n-1}^{(0)} \| t_{n}^{(0)} \| t_{n+1}^{(0)}] = \{[a_1^{(0)} - t_1^{(0)}] \bmod m_1 \| [a_2^{(0)} - t_2^{(0)}] \bmod m_2 \|$$
$$\| [a_3^{(0)} - t_3^{(0)}] \bmod m_3 \| \ldots \| [a_{i-1}^{(0)} - t_{i-1}^{(0)}] \bmod m_{i-1} \| [a_i^{(0)} - t_i^{(0)}] \bmod m_i \|$$
$$\| [a_{i+1}^{(0)} - t_{i+1}^{(0)}] \bmod m_{i+1} \| \ldots \| [a_{n-3}^{(0)} - t_{n-3}^{(0)}] \bmod m_{n-3} \| [a_{n-2}^{(0)} - t_{n-2}^{(0)}] \bmod m_{n-2} \|$$
$$\| [a_{n-1}^{(0)} - t_{n-1}^{(0)}] \bmod m_{n-1} \| [a_n^{(0)} - t_n^{(0)}] \bmod m_n \| [a_{n+1}^{(0)} - t_{n+1}^{(0)}] \bmod m_{n+1}\} =$$
$$= [0 \| a_2^{(1)} \| a_3^{(1)} \| \ldots \| a_{i-1}^{(1)} \| a_i^{(1)} \| a_{i+1}^{(1)} \| \ldots \| a_{n-3}^{(1)} \| a_{n-2}^{(1)} \| a_{n-1}^{(1)} \| a_n^{(1)} \| a_{n+1}^{(1)}];$$
performing the second subtraction:
$$A^{(2)} = A^{(1)} - NC^{(1)} =$$
$$= [0 \| a_2^{(1)} \| a_3^{(1)} \| \ldots \| a_{i-1}^{(1)} \| a_i^{(1)} \| a_{i+1}^{(1)} \| \ldots \| a_{n-3}^{(1)} \| a_{n-2}^{(1)} \| a_{n-1}^{(1)} \| a_n^{(1)} \| a_{n+1}^{(1)}] -$$
$$-[0 \| t_2^{(1)} \| t_3^{(1)} \| \ldots \| t_{i-1}^{(1)} \| t_i^{(1)} \| t_{i+1}^{(1)} \| \ldots \| t_{n-3}^{(1)} \| t_{n-2}^{(1)} \| t_{n-1}^{(1)} \| t_n^{(1)} \| t_{n+1}^{(1)}] =$$
$$= \{0 \| [a_2^{(1)} - t_2^{(1)}] \bmod m_2 \| [a_3^{(1)} - t_3^{(1)}] \bmod m_3 \| \ldots \| [a_{i-1}^{(1)} - t_{i-1}^{(1)}] \bmod m_{i-1} \|$$
$$\| [a_i^{(1)} - t_i^{(1)}] \bmod m_i \| [a_{i+1}^{(1)} - t_{i+1}^{(1)}] \bmod m_{i+1} \| \ldots \| [a_{n-3}^{(1)} - t_{n-3}^{(1)}] \bmod m_{n-3} \|$$
$$\| [a_{n-2}^{(1)} - t_{n-2}^{(1)}] \bmod m_{n-2} \| [a_{n-1}^{(1)} - t_{n-1}^{(1)}] \bmod m_{n-1} \| [a_n^{(1)} - t_n^{(1)}] \bmod m_n \|$$
$$\| [a_{n+1}^{(1)} - t_{n+1}^{(1)}] \bmod m_{n+1}\} =$$
$$= [0 \| 0 \| a_3^{(2)} \| \ldots \| a_{i-1}^{(2)} \| a_i^{(2)} \| a_{i+1}^{(2)} \| \ldots \| a_{n-3}^{(2)} \| a_{n-2}^{(2)} \| a_{n-1}^{(2)} \| a_n^{(2)} \| a_{n+1}^{(2)}];$$
performing the third subtraction:
$$A^{(3)} = A^{(2)} - NC^{(2)} =$$
$$= [0 \| 0 \| a_3^{(2)} \| \ldots \| a_{i-1}^{(2)} \| a_i^{(2)} \| a_{i+1}^{(2)} \| \ldots \| a_{n-3}^{(2)} \| a_{n-2}^{(2)} \| a_{n-1}^{(2)} \| a_n^{(2)} \| a_{n+1}^{(2)}] -$$
$$-[0 \| 0 \| t_3^{(2)} \| \ldots \| t_{i-1}^{(2)} \| t_i^{(2)} \| t_{i+1}^{(2)} \| \ldots \| t_{n-3}^{(2)} \| t_{n-2}^{(2)} \| t_{n-1}^{(2)} \| t_n^{(2)} \| t_{n+1}^{(2)}] =$$
$$= \{0 \| 0 \| [a_3^{(2)} - t_3^{(2)}] \bmod m_3 \| \ldots \| [a_{i-1}^{(2)} - t_{i-1}^{(2)}] \bmod m_{i-1} \| [a_i^{(2)} - t_i^{(2)}] \bmod m_i \|$$
$$\| [a_{i+1}^{(2)} - t_{i+1}^{(2)}] \bmod m_{i+1} \| \ldots \| [a_{n-3}^{(2)} - t_{n-3}^{(2)}] \bmod m_{n-3} \| [a_{n-2}^{(2)} - t_{n-2}^{(2)}] \bmod m_{n-2} \|$$
$$\| [a_{n-1}^{(2)} - t_{n-1}^{(2)}] \bmod m_{n-1} \| [a_n^{(2)} - t_n^{(2)}] \bmod m_n \| [a_{n+1}^{(2)} - t_{n+1}^{(2)}] \bmod m_{n+1}\} =$$
$$= [0 \| 0 \| 0 \| a_4^{(3)} \| a_5^{(3)} \| \ldots \| a_{i-1}^{(3)} \| a_i^{(3)} \| a_{i+1}^{(3)} \| \ldots \| a_{n-3}^{(3)} \| a_{n-2}^{(3)} \| a_{n-1}^{(3)} \| a_n^{(3)} \| a_{n+1}^{(3)}],$$
etc. The algorithm for performing the SN procedure is presented in Table. 1. In accordance with this algorithm, the initial number $A = A^{(0)} = (a_1^{(0)} \| a_2^{(0)} \| \ldots \| a_i^{(0)} \| \| a_{i+1}^{(0)} \| \ldots \| a_n^{(0)} \| a_{n+1}^{(0)})$ according to the formula (4) is sequentially converted to the form $A^{(Z)} = (0 \| 0 \| \ldots \| 0 \| \gamma_{n+1})$ with the help of a sequence of operations that does not result in the output of the numerical value of the number $A^{(0)}$ over the working range $[0, M)$ of the SRC. In this case, the initial number $A = A^{(0)} = (a_1^{(0)} \| a_2^{(0)} \| \ldots \| a_i^{(0)} \| a_{i+1}^{(0)} \| \ldots \| a_n^{(0)} \| a_{n+1}^{(0)})$ is sequentially reduced to the form $A^{(H)}$, i.e.
$$A = A^{(0)} = (a_1^{(0)}, a_2^{(0)}, \ldots, a_i^{(0)}, a_{i+1}^{(0)}, \ldots, a_n^{(0)}, a_{n+1}^{(0)}),$$
$$A^{(1)} = (0,\ a_2^{(1)}, a_3^{(1)}, \ldots, a_n^{(1)}, a_{n+1}^{(1)}),$$
$$A^{(2)} = (0,\ 0,\ a_3^{(2)}, \ldots, a_n^{(2)}, a_{n+1}^{(2)}),$$
$$A^{(3)} = (0,\ 0,\ 0,\ a_4^{(3)}, \ldots, a_n^{(3)}, a_{n+1}^{(3)}) \text{ and so on.}$$

Table 1. SN Algorithm

Operation number	Contents of operation
1	Appeal by value $a_1^{(0)}$ and number $A^{(0)}$ in BNC_0 for the $NC^{(0)}$.
2	Performing a subtraction operation $A^{(1)} = A^{(0)} - NC^{(0)}$.
3	Appeal by value $a_2^{(1)}$ and number $A^{(1)}$ in BNC_1 for the $NC^{(1)}$.
4	Performing a subtraction operation $A^{(2)} = A^{(1)} - NC^{(1)}$.
5	Appeal by value $a_3^{(2)}$ and number $A^{(2)}$ in BNC_2 for the $NC^{(2)}$.
6	Performing a subtraction operation $A^{(3)} = A^{(2)} - NC^{(2)}$.
7	Appeal by value $a_4^{(3)}$ and number $A^{(3)}$ in BNC_3 for the $NC^{(3)}$.
8	Performing a subtraction operation $A^{(4)} = A^{(3)} - NC^{(3)}$.
⋮	…
$2n-3$	Appeal by value $a_{n-1}^{(n-2)}$ and number $A^{(n-2)}$ in BNC_{n-2} for the $NC^{(n-2)}$.
$2n-2$	Performing a subtraction operation $A^{(n-1)} = A^{(n-2)} - NC^{(n-2)}$.
$2n-1$	Appeal by value $a_n^{(n-1)}$ and number $A^{(n-1)}$ in BNC_{n-1} for the $NC^{(n-1)}$.
$2n$	Performing a subtraction operation $A^{(n)} = A^{(n-1)} - NC^{(n-1)}$. Getting a nullified number $A^{(Z)} = A^{(n)} = [0 \parallel 0 \parallel ... \parallel 0 \parallel ... \parallel 0 \parallel 0 \parallel \gamma_{n+1} = a_{n+1}^{(n)}]$.

By repeating the subtraction n times, we get the value $A^{(Z)} = (0 \parallel 0 \parallel ... \parallel 0 \parallel a_{n+1}^{(n)})$, or $A^{(Z)} = (0 \parallel 0 \parallel ... \parallel 0 \parallel \gamma_{n+1})$, where $\gamma_{n+1} = a_{n+1}^{(n)}$. The SN procedure is shown in Fig. 1.

Operation (cycle) number	Contents of operation
1	Appeal by the value of the remainder $a_1^{(0)}$ of a number $A = A^{(0)} = [a_1^{(0)} \parallel a_2^{(0)} \parallel$ $\parallel a_3^{(0)} \parallel \ldots \parallel a_{i-1}^{(0)} \parallel a_i^{(0)} \parallel a_{i+1}^{(0)} \parallel ... \parallel a_{n-3}^{(0)} \parallel a_{n-2}^{(0)} \parallel a_{n-1}^{(0)} \parallel a_n^{(0)} \parallel a_{n+1}^{(0)}]$ in BNC_0 for the NC $NC^{(0)} = [t_1^{(0)} \parallel t_2^{(0)} \parallel t_3^{(0)} \parallel ... \parallel t_{i-1}^{(0)} \parallel t_i^{(0)} \parallel t_{i+1}^{(0)} \parallel ...$ $\ldots \parallel t_{n-3}^{(0)} \parallel t_{n-2}^{(0)} \parallel t_{n-1}^{(0)} \parallel t_n^{(0)} \parallel t_{n+1}^{(0)}]$; $t_1^{(0)} = a_1^{(0)}$; $t_1^{(0)} = \overline{0, m_1 - 1}$.
2	Performing a subtraction operation $A^{(1)} = A^{(0)} - NC^{(0)} = [a_1^{(0)} \parallel a_2^{(0)} \parallel$ $\parallel a_3^{(0)} \parallel \ldots \parallel a_{i-1}^{(0)} \parallel a_i^{(0)} \parallel a_{i+1}^{(0)} \parallel ... \parallel a_{n-3}^{(0)} \parallel a_{n-2}^{(0)} \parallel a_{n-1}^{(0)} \parallel a_n^{(0)} \parallel a_{n+1}^{(0)}] -$ $-[t_1^{(0)} \parallel t_2^{(0)} \parallel t_3^{(0)} \parallel \ldots \parallel t_{i-1}^{(0)} \parallel t_i^{(0)} \parallel t_{i+1}^{(0)} \parallel \ldots \parallel t_{n-3}^{(0)} \parallel t_{n-2}^{(0)} \parallel t_{n-1}^{(0)} \parallel t_n^{(0)} \parallel t_{n+1}^{(0)}] =$ $= \{[a_1^{(0)} - t_1^{(0)}] \bmod m_1 \parallel [a_2^{(0)} - t_2^{(0)}] \bmod m_2 \parallel [a_3^{(0)} - t_3^{(0)}] \bmod m_3 \parallel ...$

	$\ldots \Vert [a_{i-1}^{(0)} - t_{i-1}^{(0)}] \bmod m_{i-1} \Vert [a_i^{(0)} - t_i^{(0)}] \bmod m_i \Vert [a_{i+1}^{(0)} - t_{i+1}^{(0)}] \bmod m_{i+1} \Vert \ldots$ $\ldots \Vert [a_{n-3}^{(0)} - t_{n-3}^{(0)}] \bmod m_{n-3} \Vert [a_{n-2}^{(0)} - t_{n-2}^{(0)}] \bmod m_{n-2} \Vert [a_{n-1}^{(0)} - t_{n-1}^{(0)}] \bmod m_{n-1} \Vert$ $\Vert [a_n^{(0)} - t_n^{(0)}] \bmod m_n \Vert [a_{n+1}^{(0)} - t_{n+1}^{(0)}] \bmod m_{n+1} \} = [0 \Vert a_2^{(1)} \Vert a_3^{(1)} \Vert \ldots \Vert a_{i-1}^{(1)} \Vert a_i^{(1)} \Vert$ $\Vert a_{i+1}^{(1)} \Vert \ldots \Vert a_{n-3}^{(1)} \Vert a_{n-2}^{(1)} \Vert a_{n-1}^{(1)} \Vert a_n^{(1)} \Vert a_{n+1}^{(1)}]$.
3	Appeal by the value of the remainder $a_2^{(1)}$ of a number $A^{(1)} = [0 \Vert a_2^{(1)} \Vert a_3^{(1)} \Vert \ldots$ $\ldots \Vert a_{i-1}^{(1)} \Vert a_i^{(1)} \Vert a_{i+1}^{(1)} \Vert \ldots \Vert a_{n-3}^{(1)} \Vert a_{n-2}^{(1)} \Vert a_{n-1}^{(1)} \Vert a_n^{(1)} \Vert a_{n+1}^{(1)}]$ in BNC_1 for the NC $NC^{(1)} = [0 \Vert t_2^{(1)} \Vert t_3^{(1)} \Vert \ldots \Vert t_{i-1}^{(1)} \Vert t_i^{(1)} \Vert t_{i+1}^{(1)} \Vert \ldots \Vert t_{n-3}^{(1)} \Vert t_{n-2}^{(1)} \Vert$ $\Vert t_{n-1}^{(1)} \Vert t_n^{(1)} \Vert t_{n+1}^{(1)}]$; $t_2^{(1)} = a_2^{(1)}$; $t_2^{(1)} = \overline{0, m_2 - 1}$.
4	Performing a subtraction operation $A^{(2)} = A^{(1)} - NC^{(1)} = \left[0 \Vert a_2^{(1)} \Vert a_3^{(1)} \Vert \ldots\right.$ $\left.\ldots \Vert a_{i-1}^{(1)} \Vert a_i^{(1)} \Vert a_{i+1}^{(1)} \Vert \ldots \Vert a_{n-3}^{(1)} \Vert a_{n-2}^{(1)} \Vert a_{n-1}^{(1)} \Vert a_n^{(1)} \Vert a_{n+1}^{(1)}\right] - \left[0 \Vert t_2^{(1)} \Vert t_3^{(1)} \Vert \ldots \Vert t_{i-1}^{(1)} \Vert\right.$ $\left. t_i^{(1)} \Vert t_{i+1}^{(1)} \Vert \ldots \Vert t_{n-3}^{(1)} \Vert t_{n-2}^{(1)} \Vert t_{n-1}^{(1)} \Vert t_n^{(1)} \Vert t_{n+1}^{(1)}\right] = \{0 \Vert [a_2^{(1)} - t_2^{(1)}] \bmod m_2 \Vert$ $\Vert [a_3^{(1)} - t_3^{(1)}] \bmod m_3 \Vert \ldots \Vert [a_{i-1}^{(1)} - t_{i-1}^{(1)}] \bmod m_{i-1} \Vert [a_i^{(1)} - t_i^{(1)}] \bmod m_i \Vert$ $\Vert [a_{i+1}^{(1)} - t_{i+1}^{(1)}] \bmod m_{i+1} \Vert \ldots \Vert [a_{n-3}^{(1)} - t_{n-3}^{(1)}] \bmod m_{n-3} \Vert [a_{n-2}^{(1)} - t_{n-2}^{(1)}] \bmod m_{n-2} \Vert$ $\Vert [a_{n-1}^{(1)} - t_{n-1}^{(1)}] \bmod m_{n-1} \Vert [a_n^{(1)} - t_n^{(1)}] \bmod m_n \Vert [a_{n+1}^{(1)} - t_{n+1}^{(1)}] \bmod m_{n+1} \} =$ $= [0 \Vert 0 \Vert a_3^{(2)} \Vert \ldots \Vert a_{i-1}^{(2)} \Vert a_i^{(2)} \Vert a_{i+1}^{(2)} \Vert \ldots \Vert a_{n-3}^{(2)} \Vert a_{n-2}^{(2)} \Vert a_{n-1}^{(2)} \Vert a_n^{(2)} \Vert a_{n+1}^{(2)}]$.
5	Appeal by the value of the remainder $a_3^{(2)}$ of a number $A^{(2)} = [0 \Vert 0 \Vert a_3^{(2)} \Vert \ldots$ $\ldots \Vert a_{i-1}^{(2)} \Vert a_i^{(2)} \Vert a_{i+1}^{(2)} \Vert \ldots \Vert a_{n-3}^{(2)} \Vert a_{n-2}^{(2)} \Vert a_{n-1}^{(2)} \Vert a_n^{(2)} \Vert a_{n+1}^{(2)}]$ in BNC_2 for the NC $NC^{(2)} = [0 \Vert 0 \Vert t_3^{(2)} \Vert \ldots \Vert t_{i-1}^{(2)} \Vert t_i^{(2)} \Vert t_{i+1}^{(2)} \Vert \ldots \Vert t_{n-3}^{(2)} \Vert t_{n-2}^{(2)} \Vert t_{n-1}^{(2)} \Vert$ $\Vert t_n^{(2)} \Vert t_{n+1}^{(2)}]$; $t_3^{(2)} = a_3^{(2)}$; $t_3^{(2)} = \overline{0, m_3 - 1}$.
6	Performing a subtraction operation $A^{(3)} = A^{(2)} - NC^{(2)} = [0 \Vert 0 \Vert a_3^{(2)} \Vert \ldots$ $\ldots \Vert a_{i-1}^{(2)} \Vert a_i^{(2)} \Vert a_{i+1}^{(2)} \Vert \ldots \Vert a_{n-3}^{(2)} \Vert a_{n-2}^{(2)} \Vert a_{n-1}^{(2)} \Vert a_n^{(2)} \Vert a_{n+1}^{(2)}] - [0 \Vert 0 \Vert t_3^{(2)} \Vert \ldots \Vert t_{i-1}^{(2)} \Vert$ $\Vert t_i^{(2)} \Vert t_{i+1}^{(2)} \Vert \ldots \Vert t_{n-3}^{(2)} \Vert t_{n-2}^{(2)} \Vert t_{n-1}^{(2)} \Vert t_n^{(2)} \Vert t_{n+1}^{(2)}] = \{0 \Vert 0 \Vert [a_3^{(2)} - t_3^{(2)}] \bmod m_3 \Vert \ldots$ $\ldots \Vert [a_{i-1}^{(2)} - t_{i-1}^{(2)}] \bmod m_{i-1} \Vert [a_i^{(2)} - t_i^{(2)}] \bmod m_i \Vert [a_{i+1}^{(2)} - t_{i+1}^{(2)}] \bmod m_{i+1} \Vert \ldots$ $\ldots \Vert [a_{n-3}^{(2)} - t_{n-3}^{(2)}] \bmod m_{n-3} \Vert [a_{n-2}^{(2)} - t_{n-2}^{(2)}] \bmod m_{n-2} \Vert [a_{n-1}^{(2)} - t_{n-1}^{(2)}] \bmod m_{n-1} \Vert$ $\Vert [a_n^{(2)} - t_n^{(2)}] \bmod m_n \Vert [a_{n+1}^{(2)} - t_{n+1}^{(2)}] \bmod m_{n+1} \} =$

	$=[0 \Vert 0 \Vert 0 \Vert a_4^{(3)} \Vert a_5^{(3)} \Vert \ldots \Vert a_{i-1}^{(3)} \Vert a_i^{(3)} \Vert a_{i+1}^{(3)} \Vert \ldots \Vert a_{n-3}^{(3)} \Vert a_{n-2}^{(3)} \Vert a_{n-1}^{(3)} \Vert a_n^{(3)} \Vert a_{n+1}^{(3)}]$.

7	Appeal by the value of the remainder $a_4^{(3)}$ of a number $A^{(3)}=[0 \Vert 0 \Vert 0 \Vert a_4^{(3)} \Vert$ $\Vert a_5^{(3)} \Vert \ldots \Vert a_{i-1}^{(3)} \Vert a_i^{(3)} \Vert a_{i+1}^{(3)} \Vert ... \Vert a_{n-3}^{(3)} \Vert a_{n-2}^{(3)} \Vert a_{n-1}^{(3)} \Vert a_n^{(3)} \Vert a_{n+1}^{(3)}]$ in BNC_3 for the NC $NC^{(3)}=[0 \Vert 0 \Vert 0 \Vert t_4^{(3)} \Vert t_5^{(3)} \Vert \ldots \Vert t_{i-1}^{(3)} \Vert t_i^{(3)} \Vert t_{i+1}^{(3)} \Vert \ldots$ $\Vert t_{n-3}^{(3)} \Vert t_{n-2}^{(3)} \Vert t_{n-1}^{(3)} \Vert t_n^{(3)} \Vert t_{n+1}^{(3)}]$; $t_4^{(3)}=a_4^{(3)}$; $t_4^{(3)}=\overline{0, m_4-1}$.

8	Performing a subtraction operation $A^{(4)}=A^{(3)}-NC^{(3)}=[0 \Vert 0 \Vert 0 \Vert a_4^{(3)} \Vert$ $\Vert a_5^{(3)} \Vert \ldots \Vert a_{i-1}^{(3)} \Vert a_i^{(3)} \Vert a_{i+1}^{(3)} \Vert ... \Vert a_{n-3}^{(3)} \Vert a_{n-2}^{(3)} \Vert a_{n-1}^{(3)} \Vert a_n^{(3)} \Vert a_{n+1}^{(3)}]-[0 \Vert 0 \Vert 0 \Vert t_4^{(3)} \Vert$ $\Vert t_5^{(3)} \Vert \ldots \Vert t_{i-1}^{(3)} \Vert t_i^{(3)} \Vert t_{i+1}^{(3)} \Vert \ldots \Vert t_{n-3}^{(3)} \Vert t_{n-2}^{(3)} \Vert t_{n-1}^{(3)} \Vert t_n^{(3)} \Vert t_{n+1}^{(3)}]=$ $=\{0 \Vert 0 \Vert 0 \Vert [a_4^{(3)}-t_4^{(3)}] \bmod m_4 \Vert [a_5^{(3)}-t_5^{(3)}] \bmod m_5 \Vert ... \Vert [a_{i-1}^{(3)}-t_{i-1}^{(3)}] \bmod m_{i-1} \Vert$ $\Vert [a_i^{(3)}-t_i^{(3)}] \bmod m_i \Vert [a_{i+1}^{(3)}-t_{i+1}^{(3)}] \bmod m_{i+1} \Vert ... \Vert [a_{n-3}^{(3)}-t_{n-3}^{(3)}] \bmod m_{n-3} \Vert$ $\Vert [a_{n-2}^{(3)}-t_{n-2}^{(3)}] \bmod m_{n-2} \Vert [a_{n-1}^{(3)}-t_{n-1}^{(3)}] \bmod m_{n-1} \Vert [a_n^{(3)}-t_n^{(3)}] \bmod m_n \Vert$ $\Vert [a_{n+1}^{(3)}-t_{n+1}^{(3)}] \bmod m_{n+1}\}=[0 \Vert 0 \Vert 0 \Vert 0 \Vert a_5^{(4)} \Vert \ldots \Vert a_{i-1}^{(4)} \Vert a_i^{(4)} \Vert a_{i+1}^{(4)} \Vert \ldots$ $... \Vert a_{n-3}^{(4)} \Vert a_{n-2}^{(4)} \Vert a_{n-1}^{(4)} \Vert a_n^{(4)} \Vert a_{n+1}^{(4)}]$.

For value $A^{(i)}$	Appeal by the value of the remainder $a_i^{(i-1)}$ of a number $A^{(i-1)}=[0 \Vert 0 \Vert 0 \Vert \ldots \Vert 0 \Vert$ $\Vert a_i^{(i-1)} \Vert a_{i+1}^{(i-1)} \Vert \ldots \Vert a_{n-3}^{(i-1)} \Vert a_{n-2}^{(i-1)} \Vert a_{n-1}^{(i-1)} \Vert a_n^{(i-1)} \Vert a_{n+1}^{(i-1)}]$ in BNC_{i-1} for the NC $NC^{(i-1)}=[0 \Vert 0 \Vert 0 \Vert \ldots \Vert 0 \Vert t_i^{(i-1)} \Vert t_{i+1}^{(i-1)} \Vert \ldots \Vert t_{n-3}^{(i-1)} \Vert t_{n-2}^{(i-1)} \Vert t_{n-1}^{(i-1)} \Vert$ $\Vert t_n^{(i-1)} \Vert t_{n+1}^{(i-1)}]$; $t_i^{(i-1)}=a_i^{(i-1)}$; $t_i^{(i-1)}=\overline{0, m_i-1}$.
	Performing a subtraction operation $A^{(i)}=A^{(i-1)}-NC^{(i-1)}=[0 \Vert 0 \Vert 0 \Vert \ldots$ $... \Vert 0 \Vert a_i^{(i-1)} \Vert a_{i+1}^{(i-1)} \Vert ... \Vert a_{n-3}^{(i-1)} \Vert a_{n-2}^{(i-1)} \Vert a_{n-1}^{(i-1)} \Vert a_n^{(i-1)} \Vert a_{n+1}^{(i-1)}]-[0 \Vert 0 \Vert 0 \Vert \ldots \Vert 0 \Vert$ $\Vert t_i^{(i-1)} \Vert t_{i+1}^{(i-1)} \Vert \ldots \Vert t_{n-3}^{(i-1)} \Vert t_{n-2}^{(i-1)} \Vert t_{n-1}^{(i-1)} \Vert t_n^{(i-1)} \Vert t_{n+1}^{(i-1)}]=\{0 \Vert 0 \Vert 0 \Vert ... \Vert 0 \Vert$ $\Vert [a_i^{(i-1)}-t_i^{(i-1)}] \bmod m_i \Vert [a_{i+1}^{(i-1)}-t_{i+1}^{(i-1)}] \bmod m_{i+1} \Vert ... \Vert [a_{n-3}^{(i-1)}-t_{n-3}^{(i-1)}] \bmod m_{n-3} \Vert$ $\Vert [a_{n-2}^{(i-1)}-t_{n-2}^{(i-1)}] \bmod m_{n-2} \Vert [a_{n-1}^{(i-1)}-t_{n-1}^{(i-1)}] \bmod m_{n-1} \Vert [a_n^{(i-1)}-t_n^{(i-1)}] \bmod m_n \Vert$ $\Vert [a_{n+1}^{(i-1)}-t_{n+1}^{(i-1)}] \bmod m_{n+1}\}=[0 \Vert 0 \Vert 0 \Vert \ldots \Vert 0 \Vert 0 \Vert a_{i+1}^{(i)} \Vert \ldots \Vert a_{n-3}^{(i)} \Vert a_{n-2}^{(i)} \Vert a_{n-1}^{(i)} \Vert$ $\Vert a_n^{(i)} \Vert a_{n+1}^{(i)}]$.

$2n-3$	Appeal by the value of the remainder $a_{n-1}^{(n-2)}$ of a number $A^{(n-2)}=[0\Vert 0\Vert 0\Vert\ldots$ $\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert a_{n-1}^{(n-2)}\Vert a_n^{(n-2)}\Vert a_{n+1}^{(n-2)}]$ in BNC_{n-2} for the NC $NC^{(n-2)}=[0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert t_{n-1}^{(n-2)}\Vert t_n^{(n-2)}\Vert$ $\Vert t_{n+1}^{(n-2)}]$; $t_{n-1}^{(n-2)}=a_{n-1}^{(n-2)}$; $t_{n-1}^{(n-2)}=\overline{0,m_{n-1}-1}$.
$2n-2$	Performing a subtraction operation $A^{(n-1)}=A^{(n-2)}-NC^{(n-2)}=[0\Vert 0\Vert 0\vert\ldots$ $\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert a_{n-1}^{(n-2)}\Vert a_n^{(n-2)}\Vert a_{n+1}^{(n-2)}]-[0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots$ $\ldots\Vert 0\Vert 0\Vert t_{n-1}^{(n-2)}\Vert t_n^{(n-2)}\Vert t_{n+1}^{(n-2)}]=\{0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert$ $\Vert[a_{n-1}^{(n-2)}-t_{n-1}^{(n-2)}]\bmod m_{n-1}\Vert[a_n^{(n-2)}-t_n^{(n-2)}]\bmod m_n\Vert$ $\Vert[a_{n+1}^{(n-2)}-t_{n+1}^{(n-2)}]\bmod m_{n+1}\}=[0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert a_n^{(n-1)}\Vert$ $\Vert a_{n+1}^{(n-1)}]$.
$2n-1$	Appeal by the value of the remainder $a_n^{(n-1)}$ of a number $A^{(n-1)}=[0\Vert 0\Vert 0\Vert\ldots$ $\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert a_n^{(n-1)}\Vert a_{n+1}^{(n-1)}]$ in BNC_{n-1} for the NC $NC^{(n-1)}=[0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert\ \Vert t_n^{(n-1)}\Vert t_{n+1}^{(n-1)}]$; $t_n^{(n-1)}=a_n^{(n-1)}$; $t_n^{(n-1)}=\overline{0,m_n-1}$.
$2n$	Getting a nullified number $A^{(Z)}=A^{(n)}=A^{(n-1)}-NC^{(n-1)}=$ $=[0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert a_n^{(n-1)}\Vert a_{n+1}^{(n-1)}]-[0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots$ $\ldots\Vert 0\Vert 0\Vert 0\Vert t_n^{(n-1)}\Vert t_{n+1}^{(n-1)}]=\{0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert$ $\Vert[a_n^{(n-1)}-t_n^{(n-1)}]\bmod m_n\Vert[a_{n+1}^{(n-1)}-t_{n+1}^{(n-1)}]\bmod m_{n+1}\}=[0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots$ $\ldots\Vert 0\Vert 0\Vert 0\Vert 0\Vert a_{n+1}^{(n)}]$, где $a_{n+1}^{(n)}=\gamma_{n+1}$.
	$T_{Z1}=2\cdot n\cdot\tau_{add}$

Fig. 1. Procedure of SN of numbers in the SRC

Denoting the sampling time of the NC from the corresponding nullification block (NB) of the CS functioning in the SRC as t_1, and the time of subtracting from the number $A^{(i-1)}$ the constant $NC^{(i-1)}$, i.e. performing the operation $A^{(i)}=A^{(i-1)}-NC^{(i-1)}$ – as t_2, we get the total time T_{Z1} of the nullification procedure for the first $Z1$ method:

$$T_{Z1}=n\,(t_1+t_2). \tag{6}$$

3 Parallel subtraction method

Consider the following method ($Z3$) of operational control of data in the SRC (parallel nullification method (PNM)). The essence of the proposed control method is that the nullification procedure is carried out parallel in time for two reasons. For n -even numbers, we have $a_i^{(i-1)}$, $a^{(i-1)}_{n-i+1}$ ($i=\overline{1,n/2}$), namely $a_1^{(0)}$, $a_n^{(0)}$; $a_2^{(1)}$, $a_{n-1}^{(1)}$; $a_3^{(2)}$, $a_{n-2}^{(2)}$;… $a^{(n/2)}_{n/2}$, $a^{(n)/2)}_{n/2+1}$ (see Fig. 2). For n -odd numbers, we have $a_1^{(0)}$, $a_n^{(0)}$; $a_2^{(1)}$, $a_{n-1}^{(1)}$; $a_3^{(2)}$, $a^{(2)}_{n-2}$; … $a^{((n+1)/2-1)}_{(n+1)/2}$ (see Fig. 3). In this case, for an arbitrary value i of NC for the corresponding number, have the following form: $A^{(i)} = [\overbrace{0\|0\|\ldots\|0}^{i-zeroes}\| a^{(i)}_{i+1} \| a^{(i)}_{i+2} \|...$

$...\| a^{(i)}_{n-i-1} \| a^{(i)}_{n-i} \|\overbrace{0\|\ldots\|0\|0}^{i-\text{zeroes}}\| a^{(i)}_{n+1}]$,

$NC^{(i)} = [0\|0\|\ldots\|0\| t^{(i)}_{i+1} \| t^{(i)}_{i+2} \|\ldots\| t^{(i)}_{n-i-1} \| t^{(i)}_{n-i} \|0\|\ldots\|0\|0\| \quad \| t^{(i)}_{n+1}]$; $t^{(i)}_{i+1} = \overline{0, m_{i+1}}$, $t^{(i)}_{n-i} = \overline{0, m_{n-i}}$; $t^{(i)}_{i+1} = a^{(i)}_{i+1}$, $t^{(i)}_{n-i} = a^{(i)}_{n-i}$.

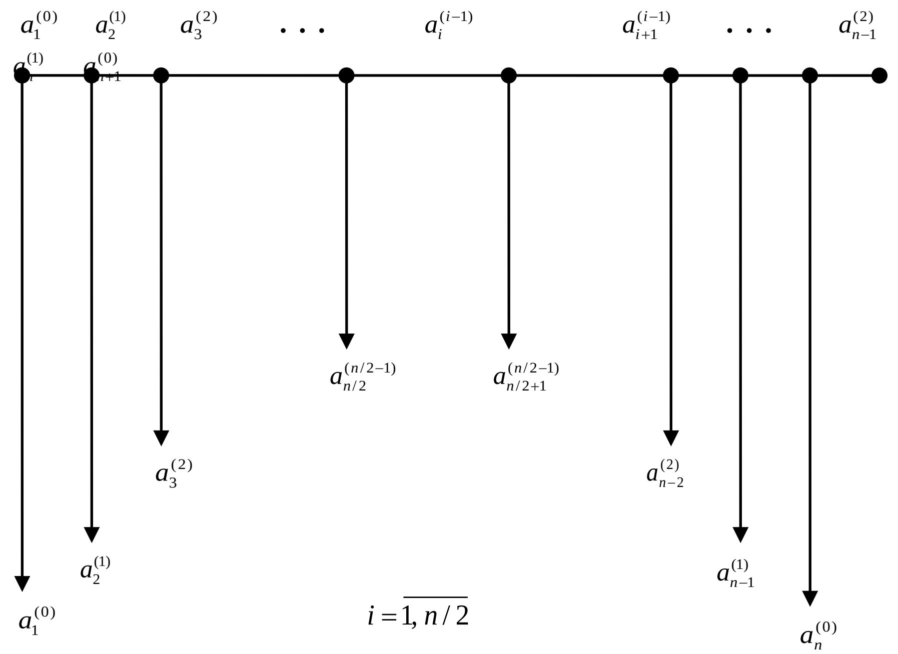

Fig. 2. Sampling scheme for nullification constants for PNM method (n –even number)

For an arbitrary value i we have that:

$$A^{(i+1)} = A^{(i)} - NC^{(i)} =$$
$$= [0\,\|\,0\,\|\ldots\|\,0\,\|\, a^{(i)}_{i+1} \,\|\, a^{(i)}_{i+2} \,\|\, a^{(i)}_{i+3} \,\|\ldots\|\, a^{(i)}_{n-i-2} \,\|\, a^{(i)}_{n-i-1} \,\|\, a^{(i)}_{n-i} \,\|\, 0 \,\|\ldots\|\, 0 \,\|\, a^{(i)}_{n+1}] -$$
$$-[0\,\|\,0\,\|\ldots\|\,0\,\|\, t^{(i)}_{i+1} \,\|\, t^{(i)}_{i+2} \,\|\, t^{(i)}_{i+3} \,\|\ldots\|\, t^{(i)}_{n-i-2} \,\|\, t^{(i)}_{n-i-1} \,\|\, t^{(i)}_{n-1} \,\|\, 0 \,\|\ldots\|\, 0 \,\|\, t^{(i)}_{n+1}] =$$

$$= \{0 \,\|\, 0 \,\|\, \ldots \,\|\, 0 \,\|\, [a_{i+1}^{(i)} - t_{i+1}^{(i)}] \bmod m_{i+1} \,\|\, [a_{i+2}^{(i)} - t_{i+2}^{(i)}] \bmod m_{i+2} \,\|\, [a_{i+3}^{(i)} - t_{i+3}^{(i)}] \bmod m_{i+3} \,\|\, \ldots$$
$$\ldots \,\|\, [a_{n-i-2}^{(i)} - t_{n-i-2}^{(i)}] \bmod m_{n-i-2} \,\|\, [a_{n-i-1}^{(i)} - t_{n-i-1}^{(i)}] \bmod m_{n-i-1} \,\|$$
$$\|\, [a_{n-i}^{(i)} - t_{n-i}^{(i)}] \bmod m_{n-i} \,\|\, 0 \,\|\, \ldots \,\|\, 0 \,\|\, [a_{n+1}^{(i)} - t_{n+1}^{(i)}] \bmod m_{n+1} \} =$$
$$= [0 \,\|\, 0 \,\|\, \ldots \,\|\, 0 \,\|\, 0 \,\|\, a_{i+2}^{(i+1)} \,\|\, a_{i+3}^{(i+1)} \,\|\, \ldots \,\|\, a_{n-i-2}^{(i+1)} \,\|\, a_{n-i-1}^{(i+1)} \,\|\, 0 \,\|\, 0 \,\|\, \ldots \,\|\, 0 \,\|\, 0 \,\|\, a_{n+1}^{(i+1)}] .$$

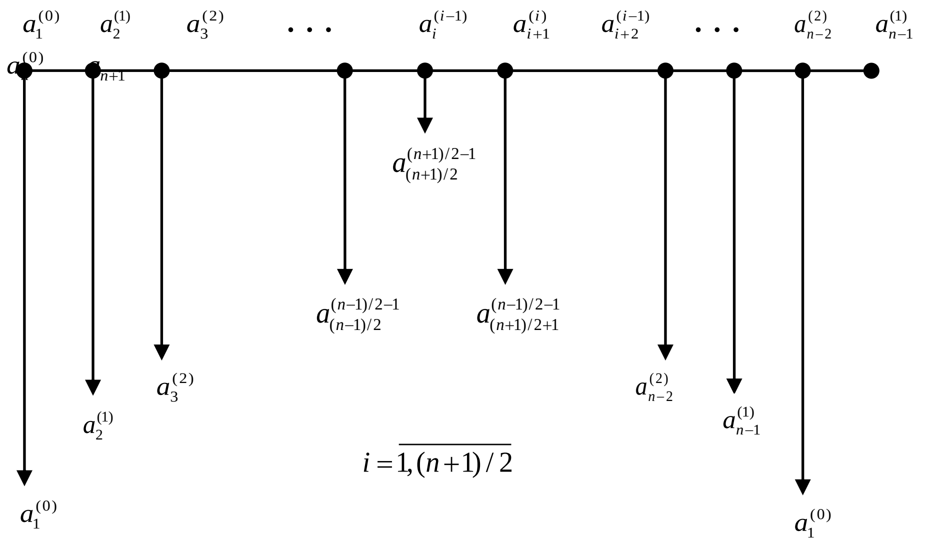

Fig. 3. Sampling scheme for nullification constants for PNM method (n – odd number)

The algorithm for performing the PNM procedure is presented in Table. 2. Before getting the value $\gamma_{n+1} = a_{n+1}^{(n/2)}$ for n - even number, we have that:

$$A^{(n/2-1)} = [\overbrace{0 \,\|\, 0 \,\|\, \ldots \,\|\, 0}^{n/2-1\text{zeroes}} \,\|\, a_{n/2}^{(n/2-1)} \,\|\, a_{n/2+1}^{(n/2-1)} \,\|\, \overbrace{0 \,\|\, \ldots \,\|\, 0 \,\|\, 0}^{n/2-1\,zeroes} \,\|\, a_{n+1}^{(n/2-1)}] .$$
$$NC^{(n/2-1)} = [\overbrace{0 \,\|\, 0 \,\|\, \ldots \,\|\, 0}^{n/2-1\text{zeroes}} \,|\, t_{n/2}^{(n/2-1)} \,\|\, t_{n/2+1}^{(n/2-1)} \,\|\, \overbrace{0 \,\|\, \ldots \,\|\, 0 \,\|\, 0}^{n/2-1\text{zeroes}} \,\|\, t_{n+1}^{(n/2-1)}] ,$$
$$t_{n/2}^{(n/2-1)} = \overline{0, m_{n/2}} , \; t_{n/2+1}^{(n/2-1)} = \overline{0, m_{n/2+1}} , \; t_{n/2}^{(n/2-1)} = a_{n/2}^{(n/2-1)} , \; t_{n/2+1}^{(n/2-1)} = a_{n/2+1}^{(n/2-1)} .$$
$$A^{(z)} = A^{(n/2)} = A^{(n/2-1)} - NC^{(n/2-1)} = \{0 \,\|\, 0 \,\|\, \ldots \,\|\, 0 \,\|\, \left[a_{n/2}^{(n/2-1)} - t_{n/2}^{(n/2-1)}\right] \bmod m_{n/2} \,\|$$
$$\|\, \left[a_{n/2+1}^{(n/2-1)} - t_{n/2+1}^{(n/2-1)}\right] \bmod m_{n/2+1} \|0 \,\|\, 0 \,\|\, \ldots \,\|\, 0 \,\|\, 0 \,\|\, \left[a_{n+1}^{(n/2-1)} - t_{n+1}^{(n/2-1)}\right] \bmod m_{n+1} \} =$$
$$= \left[0 \,\|\, 0 \,\|\, \ldots \,\|\, 0 \,\|\, 0 \|0\| \ldots \|0\|0\| a_{n+1}^{(n/2)}\right], \text{ where } \gamma_{n+1} = a_{n+1}^{(n/2)} .$$

Before getting the value $\gamma_{n+1} = a_{n+1}^{(n/2)}$ for n -odd number, we have that

$$A^{((n+1)/2-1)} = [\overbrace{0 \,\|\, 0 \,\|\, \ldots \,\|\, 0}^{\frac{n+1}{2}-1 \text{ zeroes}} \,\|\, a_{(n+1)/2}^{((n+1)/2-1)} \,\overbrace{\|\, 0 \,\|\, \ldots \,\|\, 0}^{\frac{n+1}{2}-1 \text{ zeroes}} \,\|\, a_{n+1}^{((n+1)/2-1)}] .$$

Table 2. PNM algorithm

Operation number	Contents of operation
1	Appeal by the value of the remainders $a_1^{(0)}$ and $a_n^{(0)}$ of a number $A^{(0)}$ in BNC_0 for the $NC^{(0)}$.
2	Performing a subtraction operation $A^{(1)} = A^{(0)} - NC^{(0)}$.
3	Appeal by the value of the remainders $a_2^{(1)}$ and $a_{n-1}^{(1)}$ of a number $A^{(1)}$ in BNC_1 for the $NC^{(1)}$.
4	Performing a subtraction operation $A^{(2)} = A^{(1)} - NC^{(1)}$.
5	Appeal by the value of the remainders $a_2^{(2)}$ and $a_{n-2}^{(2)}$ of a number $A^{(2)}$ in BNC_2 for the $NC^{(2)}$.
6	Performing a subtraction operation $A^{(3)} = A^{(2)} - NC^{(2)}$.
…	…
i	Performing a subtraction operation $A^{(i)} = A^{(i-1)} - NC^{(i-1)}$.
$i+1$	Appeal by the value of the remainders $a_{i+1}^{(i)}$ and $a_{n-i}^{(i)}$ of a number $A^{(i)}$ in BNC_i for the $NC^{(i)}$.
$i+2$	Performing a subtraction operation $A^{(i+1)} = A^{(i)} - NC^{(i)}$.
…	…
$n-3$	Appeal by the value of the remainders $a_{n/2-1}^{(n/2-2)}$ and $a_{n/2+2}^{(n/2-2)}$ of a number $A^{(n/2-2)}$ in $BCN_{n/2-2}$ for the $NC^{(n/2-2)}$.
$n-2$	Performing a subtraction operation $A^{(n/2-1)} = A^{(n/2-2)} - NC^{(n/2-2)}$.
$n-1$	Appeal by the value of the remainders $a_{n/2}^{(n/2-1)}$ and $a_{n/2+1}^{(n/2-1)}$ of a number $A^{(n/2-1)}$ in $BNC_{n/2-1}$ for the $NC^{(n/2-1)}$.
n	Performing a subtraction operation $A^{(n/2)} = A^{(n/2-1)} - NC^{(n/2-1)}$. Getting nullified number $A^{(Z)}$ $A^{(Z)} = A^{(n/2)} = [0 \parallel 0 \parallel ... \parallel 0 \parallel ... \parallel 0 \parallel 0 \parallel \gamma_{n+1} = a_{n+1}^{(n/2)}]$.

$$NC^{((n+1)/2-1)} = [0 \| 0 \| \dots \| 0 \| t_{(n+1)/2}^{((n+1)/2-1)} \| 0 \| \dots \| 0 \| t_{n+1}^{((n+1)/2-1)}],$$

$$t_{(n+1)/2}^{((n+1)/2-1)} = \overline{0, m_{(n+1)/2}}\,;\ t_{(n+1)/2}^{((n+1)/2-1)} = a_{(n+1)/2}^{((n+1)/2-1)}.$$

$$A^{(Z)} = A^{(n+1)/2} = A^{((n+1)/2-1)} - NC^{((n+1)/2-1)} =$$

$$= \left\{0 \| 0 \| \dots \| 0 \| \left[a_{(n+1)/2}^{((n+1)/2-1)} - t_{(n+1)/2}^{((n+1)/2-1)}\right] \bmod m_{(n+1)/2} \| 0 \| ... 0 \| 0 \| \dots \| 0 \| 0 \|\right.$$

$$\left.\| \left[a_{n+1}^{((n+1)/2-1)} - t_{n+1}^{((n+1)/2-1)}\right] \bmod m_{n+1}\right\} = \left[0 \| 0 \| \dots \| 0 \| \dots \| 0 \| 0 \| a_{n+1}^{(n+1)/2}\right], \text{ where}$$

$$\gamma_{n+1} = a_{n+1}^{(n+1)/2}.$$

PNM method in the SRC presented in Fig. 4.

Operation number (cycle)	Contents of operation
1	Appeal by the value of the remainders $a_1^{(0)}$ and $a_n^{(0)}$ of a number $A = A^{(0)} = [a_1^{(0)} \|$ $\| a_2^{(0)} \| a_3^{(0)} \| \dots \| a_{i-1}^{(0)} \| a_i^{(0)} \| a_{i+1}^{(0)} \| ... \| a_{n-3}^{(0)} \| a_{n-2}^{(0)} \| a_{n-1}^{(0)} \| a_n^{(0)} \| a_{n+1}^{(0)}]$ in BNC_0 for the $NC^{(0)} = [t_1^{(0)} \| t_2^{(0)} \| t_3^{(0)} \| \dots \| t_{i-1}^{(0)} \| t_i^{(0)} \| t_{i+1}^{(0)} \| \dots$ $... \| t_{n-3}^{(0)} \| t_{n-2}^{(0)} \| t_{n-1}^{(0)} \| t_n^{(0)} \| t_{n+1}^{(0)}]$; $t_1^{(0)} = a_1^{(0)}$, $t_n^{(0)} = a_n^{(0)}$; $t_1^{(0)} = \overline{0, m_1 - 1}$, $t_n^{(0)} = \overline{0, m_n - 1}$
2	Performing a subtraction operation $A^{(1)} = A^{(0)} - NC^{(0)} = [a_1^{(0)} \| a_2^{(0)} \|$ $\| a_3^{(0)} \| \dots \| a_{i-1}^{(0)} \| a_i^{(0)} \| a_{i+1}^{(0)} \| \dots \| a_{n-3}^{(0)} \| a_{n-2}^{(0)} \| a_{n-1}^{(0)} \| a_n^{(0)} \| a_{n+1}^{(0)}] - [t_1^{(0)} \| t_2^{(0)} \|$ $\| t_3^{(0)} \| \dots \| t_{i-1}^{(0)} \| t_i^{(0)} \| t_{i+1}^{(0)} \| \dots \| t_{n-3}^{(0)} \| t_{n-2}^{(0)} \| t_{n-1}^{(0)} \| t_n^{(0)} \| t_{n+1}^{(0)}] =$ $= \{[a_1^{(0)} - t_1^{(0)}] \bmod m_1 \| [a_2^{(0)} - t_2^{(0)}] \bmod m_2 \| [a_3^{(0)} - t_3^{(0)}] \bmod m_3 \| ...$ $... \| [a_{i-1}^{(0)} - t_{i-1}^{(0)}] \bmod m_{i-1} \| [a_i^{(0)} - t_i^{(0)}] \bmod m_i \| [a_{i+1}^{(0)} - t_{i+1}^{(0)}] \bmod m_{i+1} \| ...$ $... \| [a_{n-3}^{(0)} - t_{n-3}^{(0)}] \bmod m_{n-3} \| [a_{n-2}^{(0)} - t_{n-2}^{(0)}] \bmod m_{n-2} \| [a_{n-1}^{(0)} - t_{n-1}^{(0)}] \bmod m_{n-1} \| ...$ $... \| [a_n^{(0)} - t_n^{(0)}] \bmod m_n \| [a_{n+1}^{(0)} - t_{n+1}^{(0)}] \bmod m_{n+1}\} = [0 \| a_2^{(1)} \| a_3^{(1)} \| \dots$ $... \| a_{i-1}^{(1)} \| a_i^{(1)} \| a_{i+1}^{(1)} \| \dots \| a_{n-3}^{(1)} \| a_{n-2}^{(1)} \| a_{n-1}^{(1)} \| 0 \| a_{n+1}^{(1)}]$.
3	Appeal by the value of the remainders $a_2^{(1)}$ and $a_{n-1}^{(1)}$ of a number $A^{(1)} = [0 \| a_2^{(1)} \|$ $\| a_3^{(1)} \| \dots \| a_{i-1}^{(1)} \| a_i^{(1)} \| a_{i+1}^{(1)} \| \dots \| a_{n-3}^{(1)} \| a_{n-2}^{(1)} \| a_{n-1}^{(1)} \| 0 \| a_{n+1}^{(1)}]$ in BNC_1 for the $NC^{(1)} = [0 \| t_2^{(1)} \| t_3^{(1)} \| \dots \| t_{i-1}^{(1)} \| t_i^{(1)} \| t_{i+1}^{(1)} \| \dots \| t_{n-3}^{(1)} \|$ $\| t_{n-2}^{(1)} \| t_{n-1}^{(1)} \| 0 \| t_{n+1}^{(1)}]$; $t_2^{(1)} = a_2^{(1)}$, $t_{n-1}^{(1)} = a_{n-1}^{(1)}$; $t_2^{(1)} = \overline{0, m_2 - 1}$, $t_{n-1}^{(1)} = \overline{0, m_{n-1} - 1}$.

4	Performing a subtraction operation $A^{(2)} = A^{(1)} - NC^{(1)} = [0 \| a_2^{(1)} \| a_3^{(1)} \| \ldots$ $... \| a_{i-1}^{(1)} \| a_i^{(1)} \| a_{i+1}^{(1)} \| \ldots \| a_{n-3}^{(1)} \| a_{n-2}^{(1)} \| a_{n-1}^{(1)} \| 0 \| a_{n+1}^{(1)}] - [0 \| t_2^{(1)} \| t_3^{(1)} \| \ldots$ $... \| t_{i-1}^{(1)} \| t_i^{(1)} \| t_{i+1}^{(1)} \| \ldots \| t_{n-3}^{(1)} \| t_{n-2}^{(1)} \| t_{n-1}^{(1)} \| 0 \| t_{n+1}^{(1)}] = \{0 \| [a_2^{(1)} - t_2^{(1)}] \bmod m_2 \|$ $\| [a_3^{(1)} - t_3^{(1)}] \bmod m_3 \| [a_4^{(1)} - t_4^{(1)}] \bmod m_4 \| ... \| [a_{i-1}^{(1)} - t_{i-1}^{(1)}] \bmod m_{i-1} \|$ $\| [a_i^{(1)} - t_i^{(1)}] \bmod m_i \| [a_{i+1}^{(1)} - t_{i+1}^{(1)}] \bmod m_{i+1} \| ... \| [a_{n-3}^{(1)} - t_{n-3}^{(1)}] \bmod m_{n-3} \|$ $\| [a_{n-2}^{(1)} - t_{n-2}^{(1)}] \bmod m_{n-2} \| [a_{n-1}^{(1)} - t_{n-1}^{(1)}] \bmod m_{n-1} \| 0 \| [a_{n+1}^{(1)} - t_{n+1}^{(1)}] \bmod m_{n+1}\} =$ $= [0 \| 0 \| a_3^{(2)} \| a_4^{(2)} \| \ldots \| a_{i-1}^{(2)} \| a_i^{(2)} \| a_{i+1}^{(2)} \| \ldots \| a_{n-3}^{(2)} \| a_{n-2}^{(2)} \| 0 \| 0 \| a_{n+1}^{(2)}]$.
5	Appeal by the value of the remainders $a_3^{(2)}$ and $a_{n-2}^{(2)}$ of a number $A^{(2)} = [0 \| 0 \|$ $\| a_3^{(2)} \| \ldots \| a_{i-1}^{(2)} \| a_i^{(2)} \| a_{i+1}^{(2)} \| \ldots \| a_{n-3}^{(2)} \| a_{n-2}^{(2)} \| 0 \| 0 \| a_{n+1}^{(2)}]$ in BNC_2 for the $NC^{(2)} = [0 \| 0 \| t_3^{(2)} \| \ldots \| t_{i-1}^{(2)} \| t_i^{(2)} \| t_{i+1}^{(2)} \| ... \| t_{n-3}^{(2)} \| t_{n-2}^{(2)} \|$ $\| 0 \| 0 \| t_{n+1}^{(2)}]$, $t_3^{(2)} = a_3^{(2)}$, $t_{n-2}^{(2)} = a_{n-2}^{(2)}$; $t_3^{(2)} = \overline{0, m_3 - 1}$, $t_{n-2}^{(2)} = \overline{0, m_{n-2} - 1}$.
6	Performing a subtraction operation $A^{(3)} = A^{(2)} - NC^{(2)} = [0 \| 0 \| a_3^{(2)} \| \ldots$ $... \| a_{i-1}^{(2)} \| a_i^{(2)} \| a_{i+1}^{(2)} \| ... \| a_{n-3}^{(2)} \| a_{n-2}^{(2)} \| 0 \| 0 \| a_{n+1}^{(2)}] - [0 \| 0 \| t_3^{(2)} \| ... \| t_{i-1}^{(2)} \| t_i^{(2)} \|$ $\| t_{i+1}^{(2)} \| \ldots \| t_{n-3}^{(2)} \| t_{n-2}^{(2)} \| 0 \| 0 \| t_{n+1}^{(2)}] = \{0 \| 0 \| [a_3^{(2)} - t_3^{(2)}] \bmod m_3 \|$ $\| [a_4^{(2)} - t_4^{(2)}] \bmod m_4 \| ... \| [a_{i-1}^{(2)} - t_{i-1}^{(2)}] \bmod m_{i-1} \| [a_i^{(2)} - t_i^{(2)}] \bmod m_i \|$ $\| [a_{i+1}^{(2)} - t_{i+1}^{(2)}] \bmod m_{i+1} \| ... \| [a_{n-3}^{(2)} - t_{n-3}^{(2)}] \bmod m_{n-3} \| [a_{n-2}^{(2)} - t_{n-2}^{(2)}] \bmod m_{n-2} \|$ $\| 0 \| 0 \| [a_{n+1}^{(2)} - t_{n+1}^{(2)}] \bmod m_{n+1}\} = [0 \| 0 \| 0 \| a_4^{(3)} \| a_5^{(2)} \| \ldots \| a_{i-1}^{(3)} \| a_i^{(3)} \| a_{i+1}^{(3)} \| \ldots$ $... \| a_{n-4}^{(3)} \| a_{n-3}^{(3)} \| 0 \| 0 \| 0 \| a_{n+1}^{(3)}]$.
For value $A^{(i)}$	Appeal by the value of the remainders $a_i^{(i-1)}$ and $a_{n-i+1}^{(i-1)}$ of a number $A^{(i-1)} = [0 \| 0 \| ...$ $... \| 0 \| a_i^{(i-1)} \| a_{i+1}^{(i-1)} \| a_{i+2}^{(i-1)} \| ... \| a_{n-i-3}^{(i-1)} \| a_{n-i}^{(i-1)} \| a_{n-i+1}^{(i-1)} \| 0 \| 0 \| ... \| 0 \| a_{n+1}^{(i-1)}]$ in BNC_{i-1} for the $NC^{(i-1)} = [0 \| 0 \| ... \| 0 \|$ $\| t_i^{(i-1)} \| t_{i+1}^{(i-1)} \| t_{i+2}^{(i-1)} \| \ldots \| t_{n-i-1}^{(i-1)} \| t_{n-i}^{(i-1)} \| t_{n-i+1}^{(i-1)} \| 0 \| 0 \| ... \| 0 \| t_{n+1}^{(i-1)}]$; $t_i^{(i-1)} = a_i^{(i-1)}$, $t_{n-i+1}^{(i-1)} = a_{n-i+1}^{(i-1)}$; $t_i^{(i-1)} = \overline{0, m_i - 1}$, $t_{n-i+1}^{(i-1)} = \overline{0, m_{n-i+1} - 1}$.

	Performing a subtraction operation $A^{(i)} = A^{(i-1)} - NC^{(i-1)} = [0 \parallel 0 \parallel 0 \parallel ...$ $... \parallel 0 \parallel a_i^{(i-1)} \parallel a_{i+1}^{(i-1)} \parallel \dots \parallel 0 \parallel 0 \parallel a_{n+1}^{(i-1)}] - [0 \parallel 0 \parallel 0 \parallel \dots \parallel 0 \parallel t_i^{(i-1)} \parallel t_{i+1}^{(i-1)} \parallel ... \parallel 0 \parallel$ $\parallel 0 \parallel t_{n+1}^{(i-1)}] = \{0 \parallel 0 \parallel ... \parallel 0 \parallel [a_i^{(i-1)} - t_i^{(i-1)}] \bmod m_i \parallel [a_{i+1}^{(i-1)} - t_{i+1}^{(i-1)}] \bmod m_{i+1} \parallel$ $\parallel [a_{i+2}^{(i-1)} - t_{i+2}^{(i-1)}] \bmod m_{i+2} \parallel ... \parallel [a_{n-i-1}^{(i-1)} - t_{n-i-1}^{(i-1)}] \bmod m_{n-i-1} \parallel$ $\parallel [a_{n-i}^{(i-1)} - t_{n-i}^{(i-1)}] \bmod m_{n-i} \parallel [a_{n-i+1}^{(i-1)} - t_{n-i+1}^{(i-1)}] \bmod m_{n-i+1} \parallel 0 \parallel 0 \parallel ... \parallel 0 \parallel$ $\parallel [a_{n+1}^{(i-1)} - t_{n+1}^{(i-1)}] \bmod m_{n+1}\} = [0 \parallel 0 \parallel ... \parallel 0 \parallel 0 \parallel a_{i+1}^{(i)} \parallel a_{i+2}^{(i)} \parallel a_{i+3}^{(i)} \parallel ...$ $... \parallel a_{n-i-1}^{(i)} \parallel a_{n-i}^{(i)} \parallel 0 \parallel 0 \parallel ... \parallel 0 \parallel a_{n+1}^{(i)}]$.
For value $A^{(i+1)}$	Appeal by the value of the remainders $a_{i+1}^{(i)}$ and $a_{n-i}^{(i)}$ of a number $A^{(i)} = [0 \parallel 0 \parallel 0 \parallel ...$ $... \parallel 0 \parallel 0 \parallel a_{i+1}^{(i)} \parallel \dots \parallel a_{n-i-1}^{(i)} \parallel a_{n-i}^{(i)} \parallel 0 \parallel 0 \parallel a_{n+1}^{(i)}]$ in BNC_i for the $NC^{(i)} = [0 \parallel 0 \parallel 0 \parallel \dots \parallel 0 \parallel 0 \parallel t_{i+1}^{(i)} \parallel \dots \parallel t_{n-i-1}^{(i)} \parallel t_{n-i}^{(i)} \parallel 0 \parallel 0 \parallel t_{n+1}^{(i)}]$; $t_{i+1}^{(i)} = a_{i+1}^{(i)}$, $t_{n-i}^{(i)} = a_{n-i}^{(i)}$; $t_{i+1}^{(i)} = \overline{0, m_{i+1} - 1}$, $t_{n-i}^{(i)} = \overline{0, m_{n-i} - 1}$.
	Performing a subtraction operation $A^{(i+1)} = A^{(i)} - NC^{(i)} = [0 \parallel 0 \parallel \dots$ $... \parallel 0 \parallel a_{i+1}^{(i)} \parallel a_{i+2}^{(i)} \parallel a_{i+3}^{(i)} \parallel ... \parallel a_{n-i-2}^{(i)} \parallel a_{n-i-1}^{(i)} \parallel a_{n-i}^{(i)} \parallel 0 \parallel ... \parallel 0 \parallel a_{n+1}^{(i)}] -$ $-[0 \parallel 0 \parallel \dots \parallel 0 \parallel t_{i+1}^{(i)} \parallel t_{i+2}^{(i)} \parallel t_{i+3}^{(i)} \parallel \dots \parallel t_{n-i-2}^{(i)} \parallel t_{n-i-1}^{(i)} \parallel t_{n-1}^{(i)} \parallel 0 \parallel ... \parallel 0 \parallel t_{n+1}^{(i)}] =$ $= \{0 \parallel 0 \parallel ... \parallel 0 \parallel [a_{i+1}^{(i)} - t_{i+1}^{(i)}] \bmod m_{i+1} \parallel [a_{i+2}^{(i)} - t_{i+2}^{(i)}] \bmod m_{i+2} \parallel$ $\parallel [a_{i+3}^{(i)} - t_{i+3}^{(i)}] \bmod m_{i+3} \parallel ... \parallel [a_{n-i-2}^{(i)} - t_{n-i-2}^{(i)}] \bmod m_{n-i-2} \parallel$ $\parallel [a_{n-i-1}^{(i)} - t_{n-i-1}^{(i)}] \bmod m_{n-i-1} \parallel [a_{n-i}^{(i)} - t_{n-i}^{(i)}] \bmod m_{n-i} \parallel 0 \parallel ... \parallel 0 \parallel$ $\parallel [a_{n+1}^{(i)} - t_{n+1}^{(i)}] \bmod m_{n+1}\} = [0 \parallel 0 \parallel ... \parallel 0 \parallel 0 \parallel a_{i+2}^{(i+1)} \parallel a_{i+3}^{(i+1)} \parallel ... \parallel a_{n-i-2}^{(i+1)} \parallel a_{n-i-1}^{(i+1)} \parallel$ $\parallel 0 \parallel 0 \parallel ... \parallel 0 \parallel 0 \parallel a_{n+1}^{(i+1)}]$.
$n-1$	Further for n even n odd numbers we get: for n even number. Appeal by the value of the remainders $a_{n/2}^{(n/2-1)}$ and $a_{n/2+1}^{(n/2-1)}$ of a number $A^{(n/2-1)} = [0 \parallel 0 \parallel \dots \parallel 0 \parallel a_{n/2}^{(n/2-1)} \parallel a_{n/2+1}^{(n/2-1)} \parallel 0 \parallel \dots \parallel 0 \parallel 0 \parallel a_{n+1}^{(n/2-1)}]$ in $BNC_{n/2-1}$ for the $NC^{(n/2-1)} = [0 \parallel 0 \parallel \dots \parallel 0 \parallel t_{n/2}^{(n/2-1)} \parallel$ $\parallel t_{n/2+1}^{(n/2-1)} \parallel 0 \parallel \dots \parallel 0 \parallel 0 \parallel t_{n+1}^{(n/2-1)}]$; $t_{n/2}^{(n/2-1)} = a_{n/2}^{(n/2-1)}$, $t_{n/2+1}^{(n/2-1)} = a_{n/2+1}^{(n/2-1)}$; $t_{n/2}^{(n/2-1)} = \overline{0, m_{n/2} - 1}$, $t_{n/2+1}^{(n/2-1)} = \overline{0, m_{n/2+1} - 1}$. For n odd number. Appeal by the value of the remainder $a_{(n+1)/2}^{((n+1)/2-1)}$ of a number $A^{((n+1)/2-1)} = [0 \parallel 0 \parallel \dots$ $... \parallel 0 \parallel a_{(n+1)/2}^{((n+1)/2-1)} \parallel 0 \parallel \dots \parallel 0 \parallel a_{n+1}^{((n+1)/2-1)}]$ in $BNC_{(n+1)/2-1}$ for the

	$NC^{((n+1)/2-1)}=[0\Vert 0\Vert\ldots\Vert 0\Vert t^{((n+1)/2-1)}_{(n+1)/2}\Vert 0\Vert\ldots\Vert 0\Vert t^{((n+1)/2-1)}_{n+1}]$, $t^{((n+1)/2-1)}_{(n+1)/2}=a^{((n+1)/2-1)}_{(n+1)/2}$; $t^{((n+1)/2-1)}_{(n+1)/2}=\overline{0, m_{(n+1)/2}-1}$.

n	For n even and n odd numbers, we obtain the following values of the number $A^{(Z)}$ to be nullified. For n even number. Getting a nullified $A^{(Z)}$ number: $A^{(Z)}=A^{(n/2)}=A^{(n/2-1)}-$ $-NC^{(n/2-1)}=[0\Vert 0\Vert\ldots\Vert 0\Vert a^{(n/2-1)}_{n/2}\Vert a^{(n/2-1)}_{n/2+1}\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert a^{(n/2-1)}_{n+1}]-$ $-[0\Vert 0\Vert\ldots\Vert 0\Vert t^{(n/2-1)}_{n/2}\Vert t^{(n/2-1)}_{n/2+1}\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert t^{(n/2-1)}_{n+1}]=\{0\Vert 0\Vert\ldots\Vert 0\Vert$ $\Vert[a^{(n/2-1)}_{n/2}-t^{(n/2-1)}_{n/2}]\bmod m_{n/2}\Vert[a^{(n/2-1)}_{n/2+1}-t^{(n/2-1)}_{n/2+1}]\bmod m_{n/2+1}\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert$ $\Vert[a^{(n/2-1)}_{n+1}-t^{(n/2-1)}_{n+1}]\bmod m_{n+1}\}=\left[0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert a^{(n/2)}_{n+1}\right]$, where $\gamma_{n+1}=a^{(n/2)}_{n+1}$. For n odd number. Getting a nullified $A^{(Z)}$ number: $A^{(Z)}=A^{(n+1/2)}=A^{((n+1/2-1)}-$ $NC^{((n+1)/2-1)}=[0\Vert 0\Vert\ldots\Vert 0\Vert a^{((n+1)/2-1)}_{(n+1)/2}\Vert 0\Vert\ldots\Vert 0\Vert a^{((n+1)/2-1)}_{n+1}]-[0\Vert 0\Vert\ldots$ $\ldots\Vert 0\Vert t^{((n+1)/2-1)}_{(n+1)/2}\Vert 0\Vert\ldots\Vert 0\Vert t^{((n+1)/2-1)}_{n+1}]=\{0\Vert 0\Vert\ldots\Vert 0\Vert$ $\Vert[a^{((n+1)/2-1)}_{(n+1)/2}-t^{((n+1)/2-1)}_{(n+1)/2}]\bmod m_{(n+1)/2}\Vert 0\Vert\ldots\Vert 0\Vert$ $\Vert[a^{((n+1)/2-1)}_{n+1}-t^{((n+1)/2-1)}_{n+1}]\bmod m_{n+1}\}=[0\Vert 0\Vert\ldots\Vert 0\Vert\ldots\Vert 0\Vert 0\Vert a^{((n+1)/2)}_{n+1}]$, where $\gamma_{n+1}=a^{((n+1)/2)}_{n+1}$.
$T_{Z3}=n\cdot\tau$	

Fig. 4. Procedure of SN of numbers in the SRC

The time T_{Z3} for performing the zeroing procedure for the first ($Z3$) method of the PNM is defined as:

$$T_{Z3}=n\cdot\tau_{add.} \tag{7}$$

When implementing the nullification procedure for the second (Z3) method in the block of nullification constants (NB) of the calculator in the SRC, it is necessary to have $K_{Z3}=\sum_{i=1}^{\left[\frac{n}{2}\right]}(m_i\cdot m_{n-i+1}-1)$ nullification constants. In this case, the number of N_{Z3} double digits of the NB nullification constants is determined by the expression $K_{Z3}=\sum_{i=1}^{\left[\frac{n}{2}\right]}(m_i\cdot m_{n-i+1}-1)\cdot(n-2i+1)$.

4 Conclusions

The article presents the nullification of numbers in the system of residual classes (SRC). This method is widely used in the non-positional number system in the SRC with the need to determine positional characteristics. Two methods of nullification are presented in the article: the method of successive subtractions and the method of parallel subtractions. Based on these methods, algorithms are developed for their implementation. The essence of the method of successive subtractions is that the nullification procedure is carried out consequently from the junior foundation to the oldest. The essence of the parallel subtraction method is that the nullification procedure is carried out parallel in time for two reasons.

It is advisable to use these methods in the implementation of operations of comparing numbers in the SRC, and in monitoring data presented in the SRC [9-13]. The estimation of these methods by the number of equipment and by the time of implementation of the nullification procedure is made. In terms of the efficiency of the nullification procedure, a parallel subtraction method was proposed.

The obtained research results can be useful for various methods of increasing the reliability and fault tolerance of computer systems [14-18].

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